JPRS-UEN-84-025

20 August 1984

USSR Report

ENERGY

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service (NTIS), Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semimonthly by the NTIS, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS-UEN-84-025

20 August 1984

USSR REPORT

ENERGY

CONTENTS

FUELS

COAL

PIPELINES

PIPELINE CONSTRUCTION

UDC 658.387.64

FEATS OF OIL-INDUSTRY COMPETITION WINNERS DETAILED

Moscow NEFTYANOYE KHOZYAYSTVO in Russian No 4, Apr 84 pp 3-10

[Article by R. S. Gorshkova, N. N. Aleksatkina, L. I. Zatsepina, A. A. Nikol'skiy and Ye. N. Anastas'yeva: "The Stalwarts of Socialist Competition"]

[Text] Decisively supporting the CPSU's policy of improving socialist management, raising the degree of organization, and strengthening state, labor and plan discipline, the industry's workers are striving to make a personal contribution to an increase in the efficiency of social production, unfailingly fulfilling planned tasks.

In 1983 oil and gas-condensate recovery was 596.3 million tons, and the plan and socialist commitments for recovering gas were met (more than 1 billion m^3 of gas were recovered above the plan for 1983). The industry's drilling enterprises drilled through 25,762,000 meters of rock, and penetration increased by 2,441,000 meters over 1982. Drilling by enterprises that work under the rotating-expeditionary method in West Siberia increased (they drilled through 5,747,200 meters, which is 1,239,200 meters more than during the corresponding period of last year). By realizing measures for speeding up scientific and technical progress, an economic benefit of 302 million rubles was obtained.

Blue-collar workers, engineers, technicians and white-collar workers of Yugansknefteqaz [Yugansk Oil Production Association] of Glavtyumenneftegaz [Main Administration for Oil and Gas Industry in Tyumen Oblast] were in the vanguard of the 1983 competition.

Twenty-four associations coped successfully with increased socialist commitments for oil and gas recovery in 1983. Among them were collectives of Bashneft', Mangyshlakneft', Kuybyshevneft', Turkmenneft', Ukrneft', Grozneft', Nizhnevolzhskneft', Udmurtneft', Permneft' and Tatneft' [Bashkir, Mangyshlak, Kuybyshev, Turkmen, Ukrainian, Groznyy, Nizhnevolzhsk, Udmurt, Perm and Tatar Oil Production Associations] and other collectives.

Soyuzneftemashremont [All-Union Association for the Repair of Oil Machinery and Tools], Soyuzneftespetsmaterialy [All-Union Association for Special

Materials for the Oil Industry] and Soyuzneftegazpererabotka [All-Union Association for Oil and Gas Processing] and enterprises and organizations of Glavtransneft' [Main Administration for Oil Pipeline Transport] and the Administration for Field Geophysics and Well Logging fulfilled the plan and socialist commitments.

Many brigades of the leading vocations that are achieving stable results in meeting production goals and strenuous socialist commitments also have shown an example of high patriotic and civic duty.

More than 800 drilling, derrickbuilding, oil-and-gas recovery, and well maintenance and overhaul brigades reported completion of the annual plan ahead of time, by the 66th anniversary of the Great October Socialist Revolution, and 1,270 brigades completed fulfillment of the goals for the first 3 years of the 11th Five-Year Plan.

Each working collective persistently waged a struggle for the rational use of energy resources, as a result of which oilfield workers saved 1.35 billion kWh of electricity.

The industry paid great attention to solving social and domestic-amenity questions. Working with subcontracting construction and installing organizations, it introduced 1,478,000 m^2 of housing space, schools for 11,416 pupils, and kindergartens for 7,150 children in 1983.

Six thousand two hundred measures for improving sanitary and hygienic conditions at work were executed, on which 11.8 million rubles were spent.

In working to realize the USSR Foodstuffs Program, sovkhozes, subsidiary farms and hog-feeding activities of the industry's enterprises and organizations turned over 12,200 live-weight tons of meat, 44,450 tons of potatoes and vegetables, 35,000 tons of milk, and 100.5 million eggs.

The results of the 1983 All-Union socialist competition of the collectives of enterprises and organizations to increase production efficiency and work quality have been summed up. The industry's 12 best collectives were awarded challenge Red Banners of the CPSU Central Committee, the USSR Council of Ministers, the AUCCTU and the Komsomol Central Committee, and the names of 9 of them have been inscribed on the All-Union Honor Plaque at the VDNKh SSSR [USSR Exhibition of Achievements of the National Economy]. Challenge Red Banners were awarded to the following collectives.

The Yuganskneftegaz Association of Glavtyumenneftegaz. After coming out as the initiator of the 1983 All-Union socialist competition among the industry's enterprises and organizations, the association's collective adopted the socialist commitments of recovering 300,000 tons of oil and 4.2 million m^3 of gas above the plan. In response to the decisions of the July 1983 CPSU Central Committee Plenum and in striving to make a worthy contribution to reaching the 1 million tons per day oil-recovery level at Tyumen Oblast's oilfields, the association's workers reviewed the original commitments and brought them up to 600,000 tons. Above-plan oil recovery actually was 763,000 tons.

In so doing, the Yugansk oilfield workers carried out the 1983 plan for recovering crude oil by 101.3 percent, gas by 103.5 percent.

The association's drillers worked with high productivity. In 1983 they drilled 2,784,000 meters, above-plan penetration was 98,000 meters versus the 50,000 meters of the commitment, and 34 wells produced oil above the plan. Net effective drilling speed rose 10.7 percent over 1982's, penetration per drilling brigade increased from 49,600 to 54,407 meters, and productive time increased 2.5 percent.

By improving the organization of labor and production, the association achieved a long period of well operation between repairs--554 days (the plan allowed 500 days), and the producing-well operating coefficient was 0.961 versus the plan-required 0.960.

The association successfully introduced integrated automation and remote control of oil-recovery production, The number of automated metering facilities increased by 94, bringing the total number to 306; 80 facilities received remote control; and 38 modular water-distribution racks have been equipped with the Elektron-2M system for accounting for water injected into the formation, and 12 of them have been equipped with remote control.

The use of low-rpm turbodrills has enabled penetration per bit to be increased by 7.2 percent, and the introduction of BU-3000 EUK drill rigs has greatly reduced equipment idle time of drilling brigades by cutting by 2-3 hours the time for transferring within a cluster and by 8 hours the time for disassembling a drill string.

Under NOT [scientific organization of work] plans, the association's enterprises in 1983 introduced 1,143 measures, provisionally released 400 people and saved 1.6 million rubles. An economic benefit of 1.5 million rubles was obtained from introducing rationalizers' suggestions.

Oil and gas recovery brigades of Leninist Komsomol Prize winner Z. M. Aminev, USSR State Prize winner P. A. Tret'yakov, and V. A. Vasil'yev, P. P. Zakharov and V. A. Kirillov did exemplary work. The brigades of foremen V. G. Mal'tsev, I. A. Klyuchikov, Yu. N. Khlestov and T. Kh. Kamaliyev overfulfilled the plan for well overhaul and maintenance of wells.

The drilling brigades of D. F. Gabdullin, S. G. Pomogaybin and A. S. Oleynikov reported that the plan for the first 4 years of the 11th Five-Year Plan was met ahead of schedule. The drilling brigades of M. V. Fakhrutdinov, A. V. Slyunin, A. A. Strekalovskiy and others fulfilled the plan for the first 3 years of the 11th Five-Year Plan more than half a year ahead of schedule. In all, 32 brigades and 6 enterprises of the association fulfilled the plan for the first 3 years of the five-year period ahead of time.

The association is paying great attention to living and working conditions. Thus, in 1983, 5 million rubles were spent to improve sanitary and hygienic conditions and to mechanize and automate production; working conditions were improved for 5,000 workers, including 800 women; some 5,000 familes got new apartments; 2 kindergartens for 650 children, schools for 1,176 pupils, stores in

Mamontovo-Pyt'yakh settlement, and a health-maintenance sanatorium for 100 persone were turned over for operation.

More than 30,000 workers are taking part in the movement for a communist attitude toward work, and more than 9,000 of them have been awarded the title, "Shock Workers of Communist Labor."

In response to the decisions of the December 1983 CPSU Central Committee Plenum, Yugansk's oilfield workers committed themselves in 1984 to recovering 600,000 tons of crude above the plan, increasing labor productivity by 1 percent, and reducing the prime cost of producing output by 0.5 percent.

The Ukrneft' Association. On 29 December 1983 this association's workers had carried out the plan for oil recovery ahead of schedule and had produced above the plan 40,400 tons of oil and gas condensate, and, since the start of the five-year plan it had produced 129,800 tons of oil and gas condensate above the plan. On 24 December 1983 the annual plan for gas recovery had been fulfilled, 107.2 million m^3 of above-plan gas had been obtained, and, since the start of the five-year plan, 290.5 million m^3 of gas above the plan had been recovered. During the past year the association performed a major set of geological-technology measures for intensifying oil and gas recovery. Thus, 95,600 tons of crude were recovered by new methods for increasing oil withdrawal from the reservoirs.

The 1983 plan for drilling wells had been carried out on 25 December, and 16,500 meters were drilled above the plan, or 41,200 meters since the start of the five-year plan. The association's drillers, who are working under the rotating-duty expeditionary method at West Siberian fields, had drilled more than 2 million meters of hole since the start of the five-year plan (more than 800,000 meters in 1983). The association's enterprises and organizations saved during the year 277 tons of fuel, 10 tons of metal and 1,379,000 kWh of electricity above the established goal.

During the 11th Five-Year Plan the association built 67,800 m^2 of housing, 25,500 m^2 of it in 1983, enabling improved housing conditions for 980 oilworkers' families. During this same period more than 20,000 people vacationed at sanatoria or recreation housing and centers.

The collectives of the brigades under oil-and-gas recovery foremen I. M. Pichkur, V. I. Nazaruk and V. I. Nosenko, drilling foremen P. V. Kuziv, M. P. Dytynko and M. P. Shkarupa, well-maintenance foremen Hero of Socialist Labor M. A. Chirvon and I. D. Voytovich and many others are in the vanguard of the socialist competition. The brigade of drilling foreman Ya. V. Solodkiy, which is working on the labor calendar of the last year of the 11th Five-Year Plan, is working especially successfully.

The wide introduction of the work experience of the Arlanneft' NGDU [Oil and Gas Recovery Administration] of the Bashneft' Association enabled well-operating time between repairs to be raised by 32 days, bringing the period up to 210 days.

More than 23,000 people were involved in the movement for a communist attitude toward work, and 216 brigades were given the title, "Communist Labor Brigade."

Inspired by the decisions of the December 1983 CPSU Central Committee Plenum, the association's workers committed themselves to recovering 35,000 tons of oil and 20 million m^3 of gas above the plan, to increasing labor productivity by 1 percent, and to reducing the prime costs of producing output by 0.5 percent during 1984.

The Nizhnevolzhskneft' Association. The association reported ahead of schedule, on 22 December 1983, that it had completed the annual task for oil and gas-condensate recovery, had recovered 87,800 tons above the plan, and had recovered 254,800 tons above the plan since the start of the five-year plan. The 1983 gas-recovery plan was overfulfilled, 77.7 million m^3 were obtained above the state plan, and 236.7 million m^3 had been obtained since the start of the five-year plan.

The collectives of drilling enterprises and organizations toiled successfully. Above-plan well penetration was 21,300 meters. Since the start of the five-year plan, 60,900 meters have been drilled above the plan, and 36 wells have been turned over.

A rise in the sophistication of servicing the wells and of the quality of overhaul and current maintenance and constant improvement in inventory utilization in 1983 enabled the operating coefficient to be raised from 0.945 to 0.954 and well-operating time between repairs to be raised from 191 days to 320 days.

The association's enterprises and organizations are making wide use of new equipment and progressive technology. Since the start of the five-year plan, 37 such measures have been introduced with an economic benefit of 5.6 million rubles. The use of the Donbass-2 hydrogen sulfide corrosion inhibitor in the waste-water pumping system cut the number of breaks in high-head water mains, enabling a saving of 250,000 rubles, and 223,000 rubles were saved by feeding the inhibitors into the wells' casing string-borehole annulus.

The association is systematically improving working, living and recreation conditions for the workers. Since the start of the five-year plan 47 facilities have been overhauled and 32 rebuilt, and 578 measures for mechanizing and automating heavy and labor-intensive work, or a total of more than 2 million rubles' worth of work was done. The operation of the two health-maintenance sanatoria completely satisfies the needs of the association's blue- and white-collar workers. The work done has enabled injuries to be reduced by 18.4 percent, the overall morbidity rate by 0.8 percent, and occupational illness to be completely overcome.

Working under the slogan, "Economizing and thriftiness are the business of each person, the common concern," the association's collective has saved since the start of the five-year plan 1,622 million kWh of electricity and 233 tons fuel, including 300,000 kWh of electricity and 110 tons of fuel above the goal in 1983. Rationalizers and inventors worked successfully. During the first 3 years of the five-year plan, 231 inventions and 3,768 rationalizers'

suggestions were put into production, with an economic benefit of more than 6.0 million rubles.

Having supported the initiative of advanced collectives of Moscow and Leningrad enterprises about fulfilling the five-year plan ahead of time, 129 brigades, including 57 drilling, 33 recovery and 24 well-overhaul and well-maintenance brigades carried out the plan for the first 3 years of the five-year plan ahead of schedule. Among them were the brigades of drilling foremen N. F. Romantsov and V. F. Sobolev from the Astrakhan UBR [drilling administration], S. A. Levin and T. G. Khalaf'yan from the Korobki UBR, N. S. Alyab'yev and A. K. Zakirov from the Volgograd UBR, A. G. Savel'yev and V. V. Titarenko from the Archeda UBR, F. F. Kozynchenko and V. I. Dudenkov from the Zhirnovsk UBR, oil and gas recovery foremen A. I. Vasechkin and V. N. Rusakov from the Archeda NGDU, A. A. Vikhlyantsev and N. I. Shapkin from the Korobki NGDU, and many others.

The well-maintenance brigade from the Archeda NGDU, supervised by foreman P. I. Starosvetskov, reported on 1 December that it had fulfilled the 4-year plan ahead of schedule.

More than 14,000 people are participating in the movement for a communist attitude toward work, and 7,802 have been awarded the honorary title, "Shock Worker of Communist Labor," and the title, "Collective of Communist Labor," has been conferred on the collectives of the Archeda NGDU and the Korobki UBR.

Guided by the decisions of the December 1983 CPSU Central Committee Plenum, the association's workers have committed themselves to recovering 40,000 tons of crude and 18 million m^3 of gas above the plan and to reducing specific labor expenditures by 1 percent and raising labor productivity by 1 percent in 1984.

The Arlanneft' NGDU of the Bashneft' Association. The collective of the Order of Labor Red Banner Arlanneft' NGDU has worked with great labor and political spirit to fulfill the tasks set by the 26th Party Congress and the July 1983 CPSU Central Committee Plenum. On 29 December the administration's blue-collar workers, engineers, technicians and white-collar workers reported fulfillment of the oil-recovery task for the third year of the 11th Five-Year Plan, the recovery of 58,500 tons of crude above the plan, and the introduction into operation of 171 new oil wells versus the established goal of 165. Operating time between repairs has been brought up to 460 days per well operated by deep sucker-rod pumps, and to 419 for wells equipped with ETsN's [electric centrifugal pumps]. These are the highest indicators in the industry.

Pumping water with surfactant additives into the oil formation has yielded 27,400 additional tons of crude, the implementation of fireflooding 2,900 tons, and the use of the field's waste water for waterflooding has enabled about 700,000 rubles to be saved. Every fifth worker of the administration is a rationalizer or inventor, and 657 suggestions were introduced in 1983 with an economic benefit of 650,000 rubles. Organizational and technical measures were executed for saving fuel and power resources, including the rebuilding of grids based on 6 and 0.4 kV and a redistribution of loads, optimal selection of transformers and electric motors, the installation of static capacitors, and the gathering of steam condensate for repeat use. All this enabled

2.92 million kWh of electricity, 672 tons of standard fuel equivalent, and 0.8 tons of metal to be saved above the established task.

The administration's management is doing much work to improve living conditions, and all the adopted commitments of the collective agreement were met. Special attention was paid to fulfilling commitments to build cultural and domestic amenity facilities and 10,800 m^2 of housing and kindergartens for 25 children were put into operation.

In implementing the decisions of the May 1982 CPSU Central Committee Plenum, the administration's workers extended practical assistance to the sponsored Sovkhoz Arlan, since the start of the five-year plan 5 pit silos have been built, including 3 of them in 1983, a water main 6.2 km long has been laid (3.5 km in 1983), 4.1 km of roads have been asphalted and 9,400 mandays of work have been spent on the potato harvest and haymaking versus 6,000 called for by the plan.

The oil-recovery brigade of foreman A. N. Farkhutdinov, who called upon all brigades to work under the slogan, "From each well--a maximum of oil at least expense," the well-maintenance brigade supervised by M. Kh. Kayumov--"The Workers' Guarantee Needs Quality Repair"--and the wall-overhaul brigade supervised by R. F. Fayzullin--"All Wells in the Inventory of Existing Facilities--to be Completed Ahead of Time,"--were the initiators of competition to raise production effectiveness and work quality. Competition under the motto, "The relay baton of communist work and everyday living conditions during the 11th Five-Year Plan," in which all the administration's collectives are participating, has been widely disseminated. All brigades are struggling for the title, "Communist Labor Collective"--of the 99 brigades, 70 won the title, as did 12 of 17 departments. The honorary title, "Shock Worker of Communist Labor," was awarded to 80 percent of all workers.

In response to the decisions of the December 1983 CPSU Central Committee Plenum, the administration's workers adopted for 1984 commitments to recover 40,000 tons of oil above the plan, to bring well operating time between repairs up to 455 days, to increase labor productivity by 1 percent, to reduce prime production costs by 0.5 percent, and to complete all five-year plan tasks successfully.

The Leninogorskneft' NGDU imeni 60-Letiya SSSR of Tatneft' Association imeni V. D. Shashin. The collective of the Leninogorskneft' NGDU is striving persistently to fulfill and overfulfill the 11th Five-Year Plan task. In 1983 the administration's oilfield workers successfully coped with fulfillment of plan tasks and socialist commitments. The plan for recovery was overfulfilled, an additional 50,000 tons of crude were supplied to the national economy, and 1,536,000 rubles of above-plan profit were obtained. The year's commitments on above-plan generation of a wide cut of light hydrocarbons (3,031 tons were produced versus the commitment for 1,200 tons) was met ahead of time. The number of wells under repair or awaiting repair was cut to 1.6 percent of the existing inventory, the time needed to introduce wells after drilling was 19.5 days, and the time between repair was 406 days, which is one of the highest in the association.

In 1983 the system for remote control of oilfield sector No 13 and the system for automation at three compressor stations were rebuilt, and 96 wells were automated. Mechanization of production processes and introduction of progressive technology permitted more than 1.7 million rubles to be saved and more than 250,000 rubles was obtained through NOT measures alone. There was a saving of 17,983,000 kWh of electricity, 18,937 GJ of thermal energy, 7.8 tons of ferrous metals, and a large quantity of other materials.

In accordance with the social-development plan for the past year, 26,200 m^2 of housing space were built, 200 m^2 of it through in-house efforts.

The administration is doing much to organize workers' recreation, and the NGDU is a shared developer of the Gutsulka Sanatorium in Truskavets and of the Kiev Sanatorium in Yalta. A recreation center with all the conveniences was built at the Karabashka water reservoir, there are a covered swimming pool and Mechanics' Palace, independent artistic activity for adults and children and creative technical groups are operating, a medical-sanatorium section for 100 beds has been established, and public-health centers are operating.

The administration has done work to consolidate the supply and equipment base for the subsidiary Sovkhoz Zelenaya Roshcha, and, with the constant assistance of the oilfield workers, the sovkhoz's workers fulfilled the plan for meat production by 100.3 percent, milk by 101.4 percent and grain by 108.5 percent.

The enterprise's workers are the starters of many patriotic initiatives in the socialist competition. The movement for the strictest savings and for the effective use of all types of resources at each workplace and at all stages of the operating process, which was started at the initiative of foreman A. G. Iskhakov's brigade under the slogan, "Each ton of fuel to be recovered at minimum cost," has received wide dissemination in the association.

Oil and gas recovery foreman USSR State Prize winner A. Z. Galeyev, installer-mechanic Distinguished RSFSR Construction Worker M. N. Gayfullin, oil-and-gas recovery operator and Distinguished Oil-and-Gas Industry Worker M. Sh. Shaymardanov and others made a worthy contribution to the overall results. The high title, "Shock Worker of Communist Labor," was conferred on 2,760 workers, 83 brigades and 11 collectives of departments on All-Union Oil and Gas Industry Workers' Day.

The challenge Red Banner of Minnefteprom [Ministry of Petroleum Industry] and the industry's trade-union central committee was awarded to the NGDU's collective for high labor achievements and for constant successful solution of social and economic problems since the start of the 11th Five-Year Plan. The administration's collective adopted strenuous socialist commitments for 1984--to recover 15,000 tons of crude above the plan--2,200 tons by the day of the elections for the USSR Supreme Soviet, and to reduce specific labor expenditures versus last year's by 1 percent and prime production costs versus the plan by 0.5 percent.

The Bogatovskneft' NGDU of Kuybyshevneft'. Blue-collar workers, engineers, technicians and white-collar workers of the Bogatovskneft' NGDU carried out by

20 November 1983 the annual plan for the recovery of oil and gas condensate and recovered 10,000 tons above the plan; it has recovered 49,000 tons since the start of the five-year plan. The annual oil-recovery task was fulfilled successfully, and 26.4 million m^3 were recovered above the plan--70.2 million m^3 since the start of the five-year plan.

New methods are being used to develop the fields (micellar solutions are being injected, oilfield waste water is being used for waterflood), and operation of the well inventory has been improved. The coefficient of operational inventory utilization is 0.938 versus the planned 0.936, the number of inactive wells has been reduced to 2.1 percent, 50 new oil wells have been put into operation, and, in so doing, the time spent on building up the facilities for each of them has been reduced by 19.5 percent, having been brought down to 9.9 days.

Introduction of the operating experience of the industry's best brigades has enabled the administration's collective to increase the operating time between repairs on wells that use SShN's [sucker-rod pumps] to 357 days versus the planned 336, and to 488 days versus the planned 388 for wells that use ETsN's.

One of the components of the collective's success is the creative activity of all the administration's workers. In 1983 an economic benefit of 1.6 million rubles was obtained by introducing new equipment and rationalizers' suggestions, and 1,501,000 kWh of electricity and 218 tons of fuel were saved above the established task. In 1983, 55 NOT measures were carried out with an economic benefit of 28,100 rubles, and, in so doing, 13 workers were tentatively released.

Socialist competition in the administration proceeds under the slogan, "To work without laggards," and all collectives are covered by it. The best results were achieved by the collective of the well-overhaul brigade of foreman G. Ya. Panov. On 29 December 1983 this brigade reported fulfillment of the task for the first 4 years of the five-year plan. The brigades for oil-and-gas recovery of foremen N. V. L'vov and A. N. Oreshin, for well maintenance of A. N. Yurchenko, and for well overhaul of N. D. Saltykov made their contribution to the administration's high results. The movement for a communist attitude toward work covers 80.1 percent of the workers.

In implementing the social development plan, during the first 3 years of the five-year Plan the collective put 20,500 m^2 of housing into operation, 5,900 m^2 of it in 1983. In carrying out the decisions of the May 1982 CPSU Central Committee Plenum and in striving to support the workers of the sponsored sovkhoz with concrete deeds, the administration's workers helped to plow and sow 300 hectares, and allotted the farm 50,000 rubles' worth of building materials and equipment that had been saved.

The NGDU's workers have decided to recover 9,000 tons of crude and 3.5 million m^3 of gas above the plan, to increase labor productivity by 1 percent, to reduce the prime cost of producing output by 0.5 percent, and to mark the fourth year of the 11th Five-Year Plan with shock work.

The Rechitsaneft' NGDU of Belorusneft' (Belorussian SSR Oil Production Association). The collective of the Rechitsaneft' NGDU achieved high indicators in meeting the plans and socialist commitments for 1983. They supplied the national economy with 20,800 tons of crude and 11.5 million m^3 of gas above the plan. Additional output worth 990,000 rubles was realized, and an above-plan profit was obtained. All the treated crude that the NGDU is turning over to customers is of the highest quality category.

One of the main factors in the collective's success is the constant concern about introducing scientific and technical achievements and advanced work and production methods. The most effective of these were optimization of the work of the mechanized well inventory and introduction of the variable-pressure method and of measures for intensifying oil recovery. An annual economic benefit of 700,000 rubles was obtained through these measures.

All the measures for studying and disseminating advanced experience (the tentative economic benefit was 115,400 rubles) contemplated by the plan were fulfilled and the integrated NOT plan was overfulfilled.

Questions of protecting the environment are favored by special attention from the collective. The recultivation of land, the use of oilfield-facility effluent for maintaining reservoir pressure and the desalination of crude enabled 202,200 rubles to be saved during the year. The administration's management is doing much, jointly with the party committee and the oilfield sector's trade-union committee, to improve work safety and to fulfill sanitary and public-health measures (78 such measures costing 146,400 rubles were implemented), and the injury rate was greatly reduced during 1983. Public inspections on work safety were held during the year under the slogan, "Work with high productivity, with high work sophistication, and without injuries or accidents."

The collective's production activity is inseparably connected with constant concern about intensifying the savings program. Last year 4,881,400 kWh of electricity, 308,600 tons of standard fuel equivalent, 8,000 GJ of heat energy and 5 tons of ferrous metals were saved.

The NGDU is doing much work to strengthen work discipline and to reduce personnel turnover. In 1983 a large-scale public inspection on the use of work-time was held, and measures to cut losses of it were developed. As a result, losses were reduced as a ratio of calendar time; they were 0.09 percent in 1983, 0.11 percent in 1982. Personnel turnover was reduced by 1.1 percent.

The greatest contribution to the collective's successes is being made by oil-and-gas recovery operators L. I. Tuzhik, I. N. Tikhinya, V. M. Gurinovich, N. A. Shul'ga, I. N. Rogovich and T. S. Kvetkovskaya, well-overhaul drillers T. D. Mustafayev, N. G. Yemel'yanenko, A. K. Shafranskiy and others.

The collectives of 11 departments, 3 sections and 55 brigades, or a total of 1,817 persons, are taking part in the movement for a communist attitude toward work. According to the results of the competition in honor of the 25th anniversary of this movement, the title, "Shock Worker of Communist Labor," was conferred on 544 advanced production workers, the title, "Communist Labor Collective on 7 administration collectives.

In response to December 1983 CPSU Central Committee Plenum decisions, the administration's collectives committed themselves to recovering 10,000 tons of crude and 4.0 million m^3 of gas above the plan, to increasing labor productivity by 1 percent and to reducing prime costs for producing output by 0.5 percent in comparison with the plan.

The Kumdagneft' NGDU of Turkmenneft' Association. The collective's annual task for oil and gas recovery was met on 8 December 1983; 25,000 tons of crude and 33 million m^3 of gas above the plan were recovered, and, since the start of the five-year plan, above-plan recovery had reached 104,000 tons of crude and 103 million m^3 of gas. This was helped greatly by the wide use of the experience of the industry's advanced collectives, which enabled well-operating time between repairs to be increased to 102.3 days versus the 66 days of the plan. The NGDU's collective paid much attention to introducing progressive technology: inhibitors for protecting against paraffin deposits, sucker-rod pumps with unitized cylinder and metal plunger, and latticed baffle plates of the TsKBN system for low-temperature gas-separation installations.

Creative initiative, a striving to improve work methods and means and to reduce time spent on operations is a distinguishing feature of the collective's work. Just by introducing 200 rationalizers' suggestions, 195,000 rubles were saved.

Through NOT measures, an economic benefit of 45,500 rubles was obtained and 12 workers were provisionally released versus the 5 planned.

Work on the economical consumption of fuel and energy resources has been set up well at the NGDU, and, as a result, 500,000 kWh of electricity and 109 tons of fuel were saved above the established plan.

The collective is constantly concerned about the workers' working and living conditions. Housing conditions for 42 oilworkers' families were improved, and air conditioners were installed at 30 workers' facilities. Kumdag oilfield workers will help the subsidiary sovkhoz do construction and repair work and haul feed, and they constantly allocate motor-vehicle transport for gathering the harvest.

The collectives that won the All-Union socialist competition, which were supervised by current-maintenance foremen B. Baldzhanov and O. Garayev, made a worthy contribution to the administration's work. The title, "Shock Worker of Communist Labor," has been conferred on 557 workers, and 143 workers are vying for this award.

In adopting socialist commitments for 1984, the administration's blue collar workers, engineers, technicians and white-collar workers decided to recover 5,000 tons of crude and 2 million m^3 of gas above the plan, to increase labor productivity by 1 percent, to reduce prime costs for producing output by 0.5 percent, and to complete five-year plan tasks as a whole successfully.

The Surgut UBR [Drilling Administration] No 2 of Surgutneftegaz [Surgut Oil and Gas Production Association] of Glavtyumenneftegaz. The collective of the Surgut UBR No 2, for the first time in the industry, reached a record output for a drilling brigade--102,000 meters of penetration, and met 2 years

ahead of time the socialist commitments it adopted in an appeal to West Siberian drilling enterprises. In working under the slogan, "Not with Numbers of People but with Skill," the collective drilled 612,700 meters since the start of the year, surpassing the plan task for penetration by 38,800 meters. During the year output per brigade rose 8.6 percent. Turned over for operation were 268 wells (13 more than planned). Labor productivity rose 6.7 percent, exceeding growth of the average wage fund. The level of labor productivity achieved exceeded that planned by 13.3 percent.

Keeping their word with honor, drillers carried out the penetration plan for the first 3 years of the five-year plan by the 25th anniversary of the movement for a communist attitude toward work--by 9 October 1983, 1,558,900 meters had been drilled. On 28 November 1983, a task for the first 3 years of the five-year plan had been carried out--the turnover of 663 wells.

The Komsomol Youth collective of the Drilling Brigade of Communist Labor imeni 60-Letiya SSSR of foreman V. L. Sidoreyko and the Komsomol Youth collective of the Drilling Brigade imeni 19th VLKSM Congress of foreman A. A. Shukyurov are already working on the account for the 12th Five-Year Plan; the drilling brigades of foremen A. P. Puminov, Yu. N. Gertner and A. D. Spitsyn carried out ahead of schedule the plan for the first 4 years of the five-year plan; one drilling brigade and three well-completion brigades are working on the schedule for the fourth year of the five-year plan.

As a result, Surgut UBR No 2 carried out the 1983 plan with 6 drilling brigades instead of the planned 9.7.

The successes achieved were the result of a high degree of vocational skills, conscientiousness and state of organization of the workers, active participation in socialist competition, and the introduction of the brigade types of organization and work incentives. All the measures called for by the plan for introducing new equipment and advanced technology during 1983 were carried out successfully. The economic benefit was 1,342,000 rubles. The greatest benefit (236,000 rubles) was obtained from the use of a rational mix of bits. Aeration and hydroactivation of plugging fluids were used to improve well-cementing quality.

The UBR developed an integrated plan for introducing NOT. In 1983, 62 measures were executed versus the planned 60. NOT covers 75 percent of the administration's workers. An economic benefit of 238,400 rubles was obtained.

A school for advanced experience based at the administration, was held in 1983 for UBR chiefs of Glavtyumenneftegaz. Nineteen people participated. They were informed in detail about the organization of socialist competition in the UBR, its organizational structure, the technology of well construction, the principles of assigning workers, and morale and material incentives.

Mentorship is of great importance in transmitting work experienced. Altogether, there are 38 mentors in the administration, the best of them being drillers N. B. Markov, I. F. Tarasov and A. P. Korendyasov, machine operator A. P. Sosipatrov, and others.

"The Unified System for Operations for Establishing Safe Working Conditions" guides the work to protect labor in the UBR. The collective is taking an active part in inspection contests for improving safety and working conditions, has repeatedly taken awards, and has had the title, "Enterprise of High Production Sophistication," conferred on it.

Of the administration's workers, 93.4 percent are taking part in the movement for communist labor. Almost half of them bear the honorary title, "Shock Worker of Communist Labor," the high title, "Communist Labor Brigade," has been conferred on two drilling brigades over a period of 4 years, and the title, "Communist Labor Collective," has been newly awarded to 11 rotating-duty drilling teams, 4 rotating-duty well-completion teams, 7 sections and the department for steam and water supply.

In responding to the decisions of the December 1983 CPSU Central Committee Plenum with deeds, the Surgut UBR No 2 again came out with an initiative for socialist competition in the industry to achieve the highest penetration per brigade for the year at least expense for all types of resources, and it decided, with transfer to a new field, to undertake again to reach the 100,000 mark for penetration per brigade, to raise labor productivity by 1.2 percent versus the plan, and to reduce prime operating costs by 1 percent.

The Bashneftegeofizika Trust [Bashkir ASSR Trust for Geophysics for the Oil and Gas Industry]. During the third year of the 11th Five-Year Plan the trust's collective prepared and transferred 23 structures under a plan for 22 to the Bashneft' Association for deep exploration drilling. Three oilfields and 6 oil deposits were discovered, 493,000 rubles' worth of well-logging research were carried out above the plan, and 135,000 km of seismic profile were constructed for exploration geophysics.

Conversion to digital recording of field information was completed, and use of the complex 24-fold observation system was increased by 32.5 percent over 1982. The amount of nonexplosive excitation sources introduced grew, with the use of which 34.3 percent of all seismic profiling was performed (versus 31.4 percent in 1982). In 1983, for the first time, work by the common depth point method (MOGT) was performed under "three-dimensional seismic exploration" schemes, which enable the mapping precision of extremely fine structural targets to be increased.

The study of wells by means of new, more perfected equipment and methods has been increased in well logging, the quality of the work has been improved, and the effectiveness of the conclusions about the productivity of the objects that promise to be petroliferous has been increased to 86 percent (versus the planned 83 percent).

The equipment and methodology of digital recording on Trias recorders and the methodology of machine processing of the results of well measurements by the NID tiltmeter, IN-1-721 digital inclinometers and UZBA-21 integrated equipment for acoustic logging have been mastered and introduced. The introduction of new equipment and methods has helped to raise the quality of and to accelerate well servicing.

Labor productivity in the budget-estimated cost per worker has been increased by 1.8 percent over the socialist commitments, and an above-plan profit of 349,000 rubles has been obtained. The economic benefit from introducing rationalizers' suggestions was 246,000 rubles for the year. Savings amount to 36,400 kWh of electricity, 11,300 GJ of heat energy, and 11 tons of ferrous metals.

The use of the brigade type of organization and pay, which covers 52 percent of the workers, enabled labor productivity to be increased (the plan task was overfulfilled by 2.8 percent, and 33 workers were tentatively released) and the labor discipline, the conscientiousness and the social activeness of the workers to be raised.

With a view to increasing the effectiveness of socialist competition, its indicators are being improved each year. Publicity and comparison are being provided by means of visual agitation (stands, corners, competition screens and the wall press). All subunits of the trust are struggling for conferment of the title, "Communist Labor Collective." The collective of the Oktyabr'skaya Well-Logging Office, as well as the collectives of 81 parties, brigades and sections, bear this high title. The title, "Shock Worker of Communist Labor," has been awarded to 1,457 advanced production workers. The Arlan and Ishimbay Well-Logging Offices are "Collectives of High Work Sophistication." The collectives of the seismological exploration parties supervised by L. N. Gavrilov, V. P. Slin'ko, I. N. Burov and others have made a substantial contribution to the achievement of high indicators, and the party headed by V. U. Gaynullin has achieved the highest labor productivity--100 km per detachment-month.

The collective of seven well-logging parties of the Oktyabr'skaya Well-Logging Office and two parties of the Arlan Well-Logging Office met the plan for the first 3 years of the five-year plan ahead of time, by 7 October.

Geophysical Repair and Outfitting Office workers--welder Sh. Kh. Shakhutdinov, milling machine operator V. K. Samosenko and drivers F. N. Duseyev and R. Kh. Davletgareyev completed 1983 in shock-work fashion with high production indicators. These workers regularly overfulfilled plan tasks and the norms for output per worker by 20-30 percent.

Well-logging enterprises and exploration parties have well-equipped fixed and field operating bases convenient for work and recreation. Hot meals are delivered to field parties directly to the place where the work is being done. The trust spent 79,000 rubles in 1983, versus 50,000 in 1982, on the designated range of measures for improving working conditions, and during the 11th Five-Year Plan housing conditions for 180 families have been improved.

The Bashneftegazgeofizika Trust collective contemplates these socialist commitments for 1984: increase labor productivity by 1 percent over the plan, and reduce the prime cost of producing output by 1.5 percent.

The "Druzhba" Trunk Oil Pipeline Administration. The communist-labor collective of the Druzhba Trunk Oil Pipeline Administration completed ahead of time, on 11 December 1983, its annual task for transfer pumping of oil and for turnover. It pumped 2,392,700 tons of oil above the plan, or 8.18 million

tons since the start of the five-year plan. Turnover in 1983 was overfulfilled by 2,378,900 ton-kilometers, and, since start of the five-year plan, by 16,171,000 ton-kilometers. During 1981-1983, 91,501,000 rubles' worth of above-plan output were realized, and 11,970,000 rubles of above-plan profit were obtained. The task of raising labor productivity was met successfully.

The introduction of new equipment and advanced technology in 1983 enables operating reliability of the oil pipeline systems to be improved and an economic benefit of 5.2 million rubles to be obtained. Inventors and rationalizers introduced 1,018 suggestions with an economic benefit of 3.1 million rubles.

The administration's laboring collectives promoted competition for the thrifty expenditure of raw and other materials and fuel and energy resources and saved 65.5 million kWh of electricity, 15,700 GJ of thermal energy, 323,000 tons of fuel and 39.6 tons of metal. The administration operated on saved electricity for 2 days in each quarter of 1983.

In responding to the decree of the December 1983 CPSU Central Committee Plenum, the administration's collective developed specific measures for reducing labor expenditures and the consumption of raw and other materials and fuel and power resources and committed itself to raising labor productivity and to reducing the prime cost of transfer pumping in comparison with the plan.

The administration continues to develop subsidiary agriculture. In 1983 new greenhouses were erected at administration enterprises, in-house meat production was developed, and sponsorship assistance was extended to 52 kolkhozes and sovkhozes.

Socialist competition among regional administrations and their structural subunits, services, departments, brigades, sectors and sections, as well as among workers of the leading trades, for the title, "Best in Vocation," was widely developed in the administration's collectives.

Advanced production workers A. V. Golubev, B. A. Protsiv, S. K. Stepanyuk, V. V. Lagutkin, M. P. Tsogla, V. N. Vyatkin and A. M. Iodgudis made a great contribution to the successful fulfillment of plan tasks and socialist commitments.

During the 25th anniversary year of the movement for a communist attitude toward work, the title, "Shock Worker of Communist Labor," was awarded to 304 workers, and, altogether, 4,905 workers in the administration have this title. Two regional administrations, 18 line-operations control centers, and 8 oil transfer pumping stations, 17 departments, and 284 brigades, sections, shifts and services bear the high title, "Communist Labor Collective." The Minchurinsk and Drogobych administrations, one oil transfer pumping station, one production servicing base and the Carpathian section bear the title, "Collective of High Production Sophistication."

The Minnibayev Gas Treatment Plant imeni Leninskiy Komsomol. The collective is coping successfully with the state plan and increased socialist commitments for the third year of the 11th Five-Year Plan. The plan for realizing output

has been carried out by 100 percent, for liquid-products output by 102.9 percent, and for dry, lean gas by 104.6 percent. Prime costs for producing commodity output were reduced by 2.3 percent below the plan, and an above-plan profit of 2,230,000 rubles was obtained. The plan for labor productivity was overfulfilled by 3.3 percent, and contractual commitments for deliveries were met.

The amount of gas treated during the year rose by 36 million m^3; the removal of liquefied gas from casing-head gas increased by 3.5 g/m^3 over 1982, enabling a high coefficient of casing-head gas utilization--95.1 percent--to be achieved and sustained in Tataria.

The refinery is producing four types of product with the Emblem of Quality, and the remainder of the output is of the first quality category. Helium output of high purity has been brought up to 83.8 percent of the total amount produced.

Operating discipline is observed strictly at the plant, and organizational and technical measures taken are aimed at continuous maintenance of the operating equipment in good working condition, timely replacement of adsorbents and reagents, modern and high-quality planned preventive maintenance of the plant's lines, and the introduction of new equipment and progressive technology.

Based upon the Minnefteprom coordination plan and the TK-2 program card, the introduction of ASU's [automated control systems] continues at the plant. In 1983 startup and setting-up work and test operation of a set of computer-assisted technical equipment were performed, and industrial-test experiments in electronic commutators for temperature indicators for bearings were conducted which enabled false response of the automatic monitoring scheme for cooling units to be precluded.

Other major technical measures which expand the enterprise's productive potential also were accomplished.

Thanks to a thrifty and proprietary attitude toward the use of energy resources, the plant's collective saved 6.9 million kWh of electricity, 58,000 GJ of heat energy and 2,200 tons of standard fuel equivalent.

Rationalizers have made a considerable contribution to successful operation of the plant's collective: 210 suggestions were introduced with an economic benefit of 180,000 rubles, and 190 proposals were adopted for implementation. The best rationalizers of the year were considered to be mechanic A. I. Chaynikov, operator N. G. Valeyev and department chief Kh. G. Vafin.

A competition under the slogan, "For the 25th anniversary of the movement for a communist attitude toward work--75 shock-work labor shifts," was organized at the plant, which bears the title, "Enterprise of Communist Labor." Competition winners--the collectives of departments Nos 04, 02, 15 and 16--were awarded Honorary Diplomas and leading production workers were awarded Honorary Certificates.

The movement for a communist attitude toward work covered 2,140 people, of whom 1,699 are Shock Workers of Communist Labor, which is 79.4 percent of the participants and 68 percent of the total number of workers.

The plant is doing much work to develop a subsidiary farm. Wheat and perennial grasses are being cultivated on the grounds around the plant, 60 head of cattle are being fed, and a greenhouse with a useful area of 3,000 m^2 is being built.

The plant is paying great attention to protecting labor (48 measures that total 72,600 rubles' worth were realized for this purpose in 1983). The plan for introducing housing was carried out (780,000 m^2 were turned over for operation).

In enthusiastically supporting the decisions of the December 1983 CPSU Central Committee Plenum, the plant's collective obligated itself to produce during the fourth year of the 11th Five-Year Plan 300,000 rubles' worth of output above the plan, to obtain 200,000 rubles of above-plan profit by improving work organization and technology, to accept 12 million m^3 of casing-head gas for processing, to increase labor productivity over the plan by 0.5 percent and to reduce the prime cost of producing commodity output by 0.3 percent.

11409
CSO: 1822/276

UDC 622.276.43"5"

INTERMITTENT WATERFLOOD AT SIBERIAN OILFIELDS DESCRIBED

Moscow NEFTYANOYE KHOZYAYSTVO in Russian No 4, Apr 84 pp 35-39

[Article by Ye. L. Kisarev, A. I. Bashurkin and V. S. Yevchenko (SibNIINP [Siberian Scientific-Research Institute for the Oil Industry]): "Generalization of Experience in Intermittent Waterflooding at West Siberian Fields"]

[Text] Intermittent injection of water for changing the direction of fluid flow was used for the first time at the Trekhozernoye field in 1971, and in 1972 this type of flooding began to be introduced at the Mortim'ya-Teterev field. In recent years attempts have been made to organize the process at the West Surgut and Ust'-Balyk fields. However, a broader method began to be introduced after SibNIINP's development in 1975 of recommendations on performing intermittent waterflood and a methodology for evaluating its effectiveness, and the development in 1980 of the basic principles for determining parameters for the practical implementation of the method (RD 39-3-507--80).

Various modifications of intermittent flooding as a function of the physical-geology characteristics of the formations and of the liquids that saturate them, the condition and stage of development, the scheme for placement of the injection and recovery wells, and the stage of buildup of the system for maintaining formation pressure were introduced at West Siberian fields. The stimulation process covered fields developed basically with row-type siting of the wells. Despite the relative diversity of the technologies for intermittent flooding, their basic differences, which are distinguished by sequence, periodicity (frequency) and amplitude (coefficient of intermittency) of change in the mode of operating the injection wells, can be singled out.

Let us examine the results of using intermittent waterflood in West Siberia's main regions.

The Shaim Region. Intermittent waterflood was performed at seven fields: Trekhozeronoye, Mortym'ya-Teterev, Yuzhno-Teterev, Vostochno-Teterev, Ubinsk, Vostochno-Tolum and Danilov, basically during the warm time of the year (May-September). Three variants of intermittent waterflood technology were singled out at the deposits of this region (table 1).

Variant I (see table 1) consisted in the alternate operation of two (or three groups of injection wells that are combined under the principle of every other

Table 1. Technology of the Intermittent Waterflood Process

Variant No.	Group No of wells	Principle of grouping	Injection regulating method	Semicycle duration, days		Time performed
				Cessation (or restrictions)	Injection	
I	2-3,4	Alternate ones, in succession	Cessation	10-30, 5-15	10-30, 30	May-Sep
II	1	In succession	Cessation	30	30	May-Sep
III	1	In succession	Cessation	120-180, more rarely 270	Constant throughout the year	Warm time of the year
IV	1-2	Alternate ones	Cessation	Less than 730	Constant throughout the year	Year round
V	2-3	Alternate ones, in succession	Cessation, restriction	30-90	30-90	May-Sep, year round
VI	2-3	Alternate ones, in succession	Restriction by 50%	30-120	30-120	Year round

one or in succession in split rows with basically a 10-day to 30-day semicycle of injection and an absence thereof (the Mortym'ya-Teterev, Trekhozernoye, Vostochno-Teterev and other fields).

Variant II (see table 1) is associated with regulation of the movement of gas-and-oil and water-and-oil contacts, and it called for periodic (a period of up to 30 days) cessation of pumping in all the wells of the injection row (the Yuzhno-Teterev deposit).

Variant III (see table 1) proposed a long cessation of the injection of water (for 120-180 days and even for 270 days during the relatively warm time of the year) for a large number of injection wells (the Ubinsk and Trekhozernoye fields, the perimeter wells of the Yuzhno-Teterev and a third split row of the Mortym'ya-Teterev fields).

The Surgut Region. Intermittent flooding was executed at five fields: Zapadno-Surgut, Solkinskoye (right shore and left shore), Ust'-Balyk, Pravdinskoye and Mamontovo. Introduction of the method was begun at the Fedorov and other fields.

Originally (1975-1976), the technology of the process consisted in the alternate operation of two (or three or four) groups of injection wells during the warm time of the year, with the injection-cessation semicycles lasting 5-15 days (more rarely up to 30 days) and injection semicycles from 15-25 to 30 days or more (see table 1, the first variant). There were wells within the groups in which water was injected the year round, for smoothing out the relative amounts of accumulated injection by well in the rows. Moreover, with

the presence at the deposit of several split rows, flooding was accomplished alternately with the operation of intersecting groups of wells in the rows. Later this diversity of technology of intermittent flooding was transformed into year-round conduct of the process by restricting the amounts of water injected, by well group, and not the complete shutdown of them (see table 1, variant V).

Two more variants of the water-injection technology can be singled out at the fields of the Surgut oil-recovery region. One of them is marked by large accumulations of specific amounts of water injected (per 1 meter of effective thickness of the formation) by well in a split row by the time of its full conquest by injection. In order to even these out, the pumping of water was stopped at injection wells for which the greatest accumulated specific amounts of water were obtained (the fields: the Pravdinskoye and the Solkinskoye--on the right shore) over a long period of time (730 days) (see table 1, variant IV). The wells, as a rule, are shut off alternately, in accordance with the adopted technology of creating a split line. The smoothing out of the accumulated specific amounts of water injected was judged by change in the coefficient of variation by well of the row.

Use of another variant of the technology of intermittent waterflood was stimulated by the drilling of new split rows that were situated transversely to the existing ones (the Ust'-Balyk field) and by the introduction of the square-block waterflood system (the Mamontov, Pravdinskoye and Federov fields). The method was realized under the principle of distribution of the amounts of water injected, by well, with transfer of the main volume of pumping to the newly created split rows.

Water was pumped intermittently in area systems for siting wells (the BS_{10} formation of the Ust'-Balyk field) in order to regulate the amounts of water injected in connection with the creeping system for developing the deposit.

The Nizhnevartovsk Region. Intermittent waterflood was introduced at five fields: the Megion, Samotlor, Vatinskoye, Sovet and Agan.

At first it was performed at fields of the Nizhnevartovsk dome, for example, at Samotlor and Megion, by alternate operation of two, three or more groups of injection wells (including wells situated transversely to placement of the wells of adjacent split rows) that are grouped in a row on the basis of the succession method. The method was introduced only during the warm season (April and May-September) with the duration of pumping-cessation semicycles of 10-15 days (more rarely up to 30 days) and pumping semicycles of 15-20 days (sometimes 45-60 days).

Starting at the end of 1975, intermittent waterflooding was applied year-round by means of alternate restrictions (based on 50 percent) and increase in the amounts of water injected, by group of wells of the split rows (see table 1, variant VI). Duration of the semicycles of reduction and increase in the current amounts of water being injected was changed from 30 to 120 days. The wells were grouped alternately and in succession for operation in one phase. For purposes of smoothing out accumulated specific amounts of injected water, by well of a row, water was injected at the maximum possible rate in

some of them with the smallest amounts injected round the year. An analysis of oilfield sector data about the introduction of intermittent waterflood indicated that it was being accomplished in accordance with RD 39-3-507--80.

Additional opportunities for intermittent stimulation of the formation by means of cyclic or varying withdrawals of fluid from production wells have appeared in connection with conversion to the gaslift method of oil recovery at West Siberian fields, since this method will enable well flow to be regulated more flexibly. A variant of the method has been implemented at one section of the Samotlor field since 1983.

Altogether, 17 fields were covered by the intermittent waterflood process in West Siberia. The amount of water pumped and the operational effectiveness of the method, which was designed according to the displacement characteristics and the methodology worked out by SibNIINP, with the use of filtrational parameters that were obtained in terms of actual oilfield data, are shown in table 2. From this it is evident that the annual amounts of intermittent pumping of water varies from 18.19 to 132.6 million m^3, and the additional oil recovered is 204,400-888,300 tons per year. The specific injection of water varies from 89 to 196 m^3/ton.

The main difficulties in introducing intermittent waterflooding of wells everywhere lie in the fact that large cluster pump stations (KNS's) are designed for steady water injection. Moreover, serially produced water-consumption regulators are lacking. Where steady and intermittent methods of injection are used, equal planned amounts of water should, as a rule, be pumped into the oil formations from each KNS. However, with intermittent pumping, wells operate with increased injectivity. Their water consumption increases as a result of increasing the injection pressure. Therefore, during intermitting pumping, pumps with higher heads should be installed at the KNS's, and the water lines and the injection wells should have a reserve of throughput and of strength. Lack of a reserve restricts the scale of introduction of waterflood.

At the fields cited in the article, the operating mode for injection wells was changed mainly by shutting them down or by covering over the tubing-casing annulus, along which the water is pumped. The method of creating additional hydraulic friction has been used less widely because of the lack of rapidly interchangeable flow beans and consumption regulators. Thus, at the Samotlor field 48 RSh-3000 consumption regulators designed by TsNIL [Central Scientific-Research Laboratory] of Tyumenneftegaz were installed. For two years these regulators showed high reliability and longevity. Their basic inadequacy consisted of the infeasibility of manufacturing them. In this connection, the production of the consumption regulator of improved design that was developed by the SPKB [Special Design-Development Office] of Soyuznefteavtomatika [All-Union Production Association for Automation of the Oil Industry] must be arranged for.

Conclusions

1. Use of the intermittent waterflood method increases the effectiveness of regulating the working of oil deposits and the current and final withdrawal

Table 2.

Производственное объединение (1)	Объем нестационарной закачки воды, млн. м³ (2)								Объем дополнительно добытой нефти, тыс. т (3)							
	Годы (4)															
	1975	1976	1977	1978	1979	1980	1981	1982	1975	1976	1977	1978	1979	1980	1981	1982
«Красноленинскнефтегаз» (5)	1,98	2,55	2,64	3,04	3,33	2,63	3,11	3,17	78,0	166,6	159,8	101,7	107,2	96,7	74,0	81,0
«Сургутнефтегаз» (6)	2,50	6,05	9,96	10,43	13,17	11,81	12,14	—	22,0	71,3	114,5	143,8	113,9	45,0	40,0	—
«Юганскнефтегаз» (7)	1,73	5,63	10,25	13,82	11,95	16,77	21,38	26,53	64,2	108,0	152,0	162,7	135,1	270,0	322,0	200,0
«Нижневартовскнефтегаз» (8)	10,17	52,24	66,04	76,04	90,98	90,99	60,40	102,90	40,2	365,0	427,5	465,1	257,8	336,2	318,0	395,0
Всего по Главтюменнефтегазу (9)	16,38	66,47	88,89	103,33	119,43	122,20	97,03	132,60	204,4	710,9	853,8	873,3	614,0	747,9	754,0	676,0
«Томскнефть» (10)	1,81	2,77	—	3,08	—	—	—	—	—	30,5	30,5	15,0	—	—	—	—
Всего по Западной Сибири (11)	18,19	69,24	88,89	106,41	119,43	122,20	97,03	132,60	204,4	741,4	884,3	888,3	614,0	747,9	754,0	676,0

1. Production association.
2. Amount of intermittent water injected, millions of m^3.
3. Amount of additional oil recovered, thousands of tons.
4. Years.
5. Krasnoleninskneftegaz [Krasnoleninsk Oil and Gas Production Association].
6. Surgutneftegaz [Surgut Oil and Gas Production Association].
7. Yuganskneftegaz [Yugansk Oil and Gas Production Association].
8. Nizhnevartovskneftegaz [Nizhnevartovsk Oil and Gas Production Association].
9. Total for Glavtyumenneftegaz [Main Administration of the Oil and Gas Industry of Tyumen Oblast].
10. Tomskneft' [Tomsk Oil and Gas Production Association].
11. Total for West Siberia.

of oil from the strata. In so doing, water encroachment of the recovered oil is lessened, enabling the capacity for treating oil and water to build up smoothly.

2. In order to increase the introduction of this method, a buildup of KNS's for intermittent pumping must be planned and the output of improved water-consumption regulators provided for.

11409
CSO: 1822/276

UDC 622.276.43:678

TECHNIQUES FOR POLYMER FLOOD OF OIL-WATER ZONES DISCUSSED

Moscow NEFTYANOYE KHOZYAYSTVO in Russian No 4, Apr 84 pp 44-47

[Article by B. I. Levi and V. M. Sankin (BashNIPIneft' [Bashkir SSR Scientific-Research and Design Institute for the Petroleum Industry]): "The Effectiveness of Polymer Flooding of Oil-and-Water Zones"]

[Text] Experimental and theoretical studies have shown the effectiveness of polymer waterflood, so it is of interest to evaluate the possibility of using this method for increasing oil recovery when developing the oil-and-water zones (VNZ's) of platform-type fields. Such zones are marked by worsened operating indicators (low oil recovery, high water encroachment and large amounts of produced water). For this purpose, the process of polymer waterflood for a five-point system of well siting was studied.

During the computations, a mathematical model, two-dimensional in the plane of a vertical cross-section [1], of the displacement of oil by fringes of water-soluble polymers was used. A third measurement--width of the flow--was considered approximately by the introduction of an appropriate function in the equation of the material balance.

The original oil-saturated thickness of the formation was assumed to be three-fifths of the total thickness of the collector (4 meters). For the oil-saturated portion of the stratum, V. M. Berezin's relative phase permeabilities for Arlan sandstones [2] with initial and residual oil saturation, which were, respectively, 0.9 and 0.26, were adopted. The part of the formation situated below the initial oil-water contact (VNK) was considered to be completely water-saturated. The viscosity of the oil and the injected water were, respectively, 20 and 1 mPa·s, and the densities were 890 and 1,000 kg/m^3. The well-network density was 24 hectares per well. For the injection wells, the stratum was considered as having been drilled-in throughout its whole thickness, for the producers--only in the oil-saturated portion. Bottom-hole pressures were adopted, respectively, as 22 and 5 MPa, and the flow rate for the producers did not exceed 135 m^3/day.

It was assumed in the calculations that a 0.05-percent aqueous solution of calciferous polyacrylamide (PAA) with a molecular weight of $3.4 \cdot 10^6$, the rheological properties of which were studied by Giprovostokneft' [State Research and Design Institute for the Oil-Recovery Industry of Eastern USSR Regions], was being injected [3]. Polymer sorption was predetermined by the Henry isotherm with a 0.1 coefficient. The time of start of PAA pumping was varied.

The inhomogeneity of the stratum in terms of thickness was simulated by a program for five intercalations of equal thickness and different permeabilities, in accordance with the lognormal distribution, with an average value of 0.5 microns^2 and a variation coefficient of 1. Five series of calculations were made for the five types of strata as a function of the arrangement of the intercalations in terms of permeability.

Type of stratum	Permeability of intercalations, microns^2, in the roof-to-floor direction
I	0.01; 0.14; 0.34; 0.62; 1.39
II	0.01; 0.34; 0.62; 1.39; 0.14
III	0.62; 0.34; 0.01; 1.39; 0.14
IV	1.39; 0.62; 0.34; 0.14; 0.01
V	0.5 (the stratum is homogenous)

Thus, permeability of the intercalations for the type I stratum grows monotonically from the roof to the floor; for type IV it diminishes; for types II and III it is, as a whole, distributed randomly, but in the unsaturated portion of the stratum a definite consistency is retained; for the type II stratum, permeability increases from the roof to the initial position of the VNK; and for type III it diminishes.

Calculations were made until 99-percent water encroachment of the producing well was reached. Some of their results for various conditions of waterflood are cited in table 1 and in figures 1-4.

Let us first examine ordinary waterflood (see table 1, variant 1). In this case, the limits of effectiveness of flooding of the VNZ under the conditions being considered were established for types I and IV strata. Displacement in the first case is marked by high initial water encroachment and low oil recovery (10 percent), with a large amount of liquid withdrawn (4.8 pore volume). In the second case, the flood's effectiveness is very high, and a recovery of 60 percent is achieved with a circulation of about 1 pore volume of the liquid (see figure 1, curve 10). Such a difference in the effectiveness of ordinary waterflood is explained not only by the permeability ratios of the parts of the collector that are higher and lower than the initial position of the VNK, but also by the mutual arrangement of the intercalations that make up the oil-saturated part of the stratum, which the calculations indicate for type II and III formations.

The variants of the ordinary flood for the type I and IV formations that have been examined represent two extreme cases, which permit the influence of vertical crossflows, gravitational forces and the nature of the distribution of permeability along the thickness of the stratum during current and final oil recovery to be clarified. For type IV strata, gravitational forces help the crude to move from poorly permeable sections to sections with high permeability and promote more rapid recovery of it from the stratum.

The effectiveness of polymer flood also is determined by the structure of the formation and the influence of certain factors. Polymer solution injection sometimes reduces final oil recovery (see figure 1a, curves 4 and 8; and table 1, variant 2, for type I and IV strata). This is occasioned by the

Table 1.

Type of stratum	Variant No.	Amount of liquid withdrawn by moment of injection of the polymer solution	Volume of polymer-solution fringe	Period of development, years	Amount of liquid withdrawn	Oil recovery percent	Additional recovery of crude per 1 ton of polyacrylamide, tons	Increase in oil recovery percent
Тип пласта	№ варианта	Объем отобранной жидкости к моменту закачки полимерного раствора	Объем оторочки полимерного раствора	Срок разработки, годы	Объем отобранной жидкости	Нефтеотдача, %	Дополнительная добыча нефти на 1 т ПАА, т	Прирост нефтеотдачи, %
I	1	—	—	38	4,8	10,0	—	—
I	2	0	0,3	52	6,5	25,2	542	15,2
I	3	2	0,3	68	8,6	26,6	591	16,6
I	4	4	0,3	79	10,0	26,7	596	16,7
II	1	—	—	77	9,7	34,6	—	—
II	2	0	0,3	34	4,1	36,3	60	1,7
II	3	2	0,3	57	7,2	40,0	192	5,4
II	4	4	0,3	78	9,9	42,0	264	7,4
II	5	2	0,1	76	9,6	37,2	282	2,6
II	6	2	0,5	47	5,6	40,0	117	5,5
II	7	2	1,0	44	4,0	40,8	66	6,2
III	1	—	—	69	6,8	50,7	—	—
III	2	0	0,3	44	2,9	52,4	60	1,7
III	3	2	0,3	60	4,8	53,8	110	3,1
IV	1	—	—	19	2,3	65,8	—	—
IV	2	0	0,3	25	2,4	64,1	—60	—1,7
IV	3	1	0,3	23	2,5	68,7	103	2,9
V	1	—	—	50	8,8	63,5	—	—
V	2	0	0,3	34	3,1	53,7	—349	—9,8
V	3	2	0,3	53	5,3	63,8	11	0,3
V	4	4	0,3	59	7,2	66,5	107	3,0

Comment. The amounts of liquid and PAA [polyacrilamide] are expressed in pore volumes.

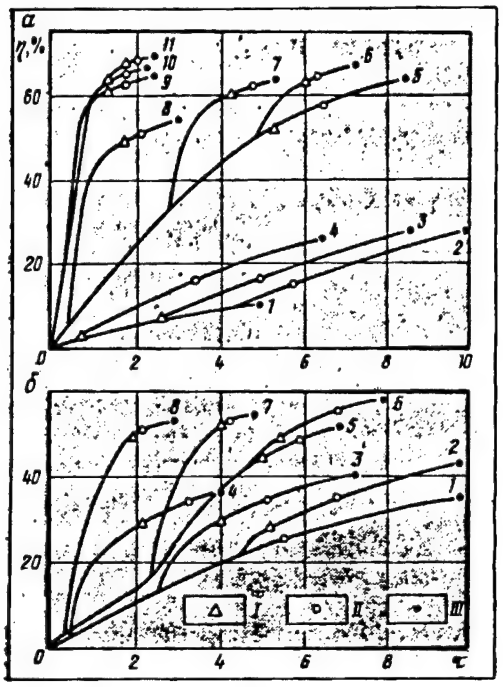


Figure 1. Oil Recovery as a Function of the Amount of Liquid Withdrawn.

I, II and III. Water encroachment of, respectively, 97, 98 and 99 percent.

a. 1-4--type I strata; 5-8--type V strata; and 9-11--type IV strata.

б. 1-4--type II strata; 5-8--Type III strata; 1, 5 and 10--with ordinary waterflood; and 2, 3 and 4--with injection of 0.3 pore volume of polymer solution after preliminary injection of water and without it; 6, 7 and 8--ditto; 9-11 with injection of 0.3 pore volume of polymer solution after preliminary injection of, respectively, 2 and 1 pore volume of water.

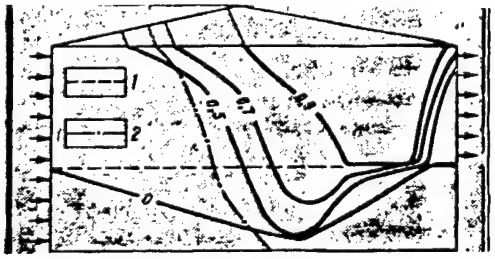


Figure 2. Isostats by the moment $\tau = 0.4$ for a Homogeneous Formation During Injection of Polymer Solution Without Preliminary Injection of Water.

1. Initial position of VNK [water-oil contact].
2. Leading edge of the fringe.

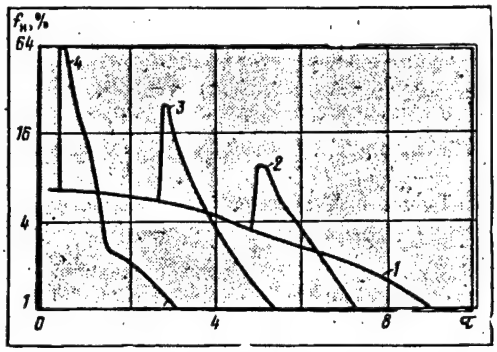


Figure 3. Function of the Share of Crude f_H in the Recovered Liquid for a Homogeneous (Type V) Formation During Ordinary Flood (1) and During Injection of a Polymer Solution After the Preliminary Injection of 4 (2) and 2 (3) Pore Volumes of Water, and Without It (4).

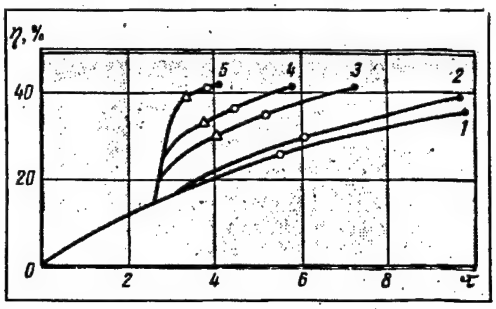


Figure 4. The Influence of Fringe Size on the Oil-Recovery Dynamics of a Type II Formation:

1. Ordinary waterflood.
2, 3, 4 and 5. Injection of polymer solution in the amounts, respectively, of 0.1, 0.3, 0.5 and 1 pore volume.

fact that when the solution is injected there occur crossflows of oil into the zone that is occupied by bottom water (see figure 2), with later displacement of the crude, that is, with conversion into a bound state. The amount of moving crude in this case is reduced. The effect noted is more pronounced when the method is applied at the initial stage of development of the VNZ. Thus, for type V strata (see figure 1a, curve 8, and table 1, variant 2), despite the substantial (up to 60 percent) rise in the share of crude in recovery wells, subsequently water encroachment is rapidly reached, and final oil recovery is reduced appreciably in comparison with ordinary flooding.

The injection of polymer solutions at a later stage will enable the crossflow of crude into water-saturated intercalations to be reduced and the final recovery to be raised. On the whole, the effectiveness of polymer flood as a method for raising oil recovery of the VNZ is determined by the stratum's structure and by the mutual positioning in its cross-section of intervals that are poorly and highly permeable. In this case, as a rule, the greatest increase in oil recovery is obtained where the effectiveness of ordinary waterflooding is not high. Thus, maximum additional oil recovery was obtained for type I strata with the injection of polymer after a preliminary injection of water (see table 1, variants 2 and 4, for type I strata). It exceeds 1.5-fold the withdrawal of crude during displacement by water (see figure 3).

The observed effect of the displacement of crude in the VNZ has not only negative consequences connected with reduction in the amount of moving crude. The displaced crude reduces the phase permeability for the water sometimes much more strongly than injection of the polymer solution. The substantial reduction (2-fold to 3-fold) of total withdrawals of liquid by the end of the development period, especially in variants with injection of polymer solution at the initial stage of operation of the deposit, is explained by the reduction in overall hydrodynamic conductivity as a result of the indicated factors.

With ordinary waterflooding, crude getting into the water-saturated intercalations was observed only for type III strata, that is, when the collector's oil-saturated and water-saturated intervals were divided by a poorly permeable intercalation. After withdrawal of liquid in the amount of 2 pore volumes, this improved oil-withdrawal dynamics (see figure 2).

Calculations were made for a type II stratum with a view to determining the influence of the volume of the fringe upon the process's effectiveness (see figure 4). The injection of polymer solution after withdrawal of 2 pore volumes of liquid was simulated. Just the same as for a purely oil stratum [3], in this case additional oil recovery rises with increase in the amount of polymer injected, while the rate of increase is reduced. For example, injection of PAA solution in the amount of 0.3 of pore volume enables final oil recovery to be raised by 5.4 percent. The same increase in volume of the fringe to 1 pore volume will increase oil recovery by an additional 0.8 percent. The effect of the injection that forms a fringe of large volume in comparison with the ordinary waterflood is manifested in a substantial reduction in the amount of liquid withdrawn by the end of development.

In order to substantiate the optimal technology for use of the method, the technical and economic indicators of the flooding variants were computed. It was assumed that 50 elements (25 wells) of the five-point system of well placement of a section of the VNZ would be introduced into development simultaneously. Therefore, the operating indicators for the whole section can be obtained after multiplying the corresponding indicators for one element by the number thereof. The results of an economic evaluation of the effectiveness of various variants for a type II stratum, which was carried out according to the methodology of [4], are shown in table 2.

Table 2

No of variant	Equated expenditures, rubles/ton	National economic benefit, in millions of tons, at highest industrywide costs, rubles/ton	
		55	80
1	63	-5.0*/-12.7**	0.1*/6.3**
2	31	5.8*/13.5**	17.1*/33.4**
3	46	-4.6*/1.8**	1.6*/23.9**
4	58	-5.8*/-9.5**	-0.5*/13.5**
5	61	-5.6*/-11.3**	-0.3*/9.2**
6	40	-3.8*/7.8**	2.7*/29.9**
7	40	-4.2*/8.1**	2.6*/30.7**

*With consideration of the time factor.
**Without consideration of the time factor.

It is evident from table 2 that, with ordinary waterflood, development of the section at existing prices for crude is not economically effective. Injecting polymer to create a fringe of 0.1 pore volume in size (variant 5) reduces the economic losses from developing the section. However, if the polymer fringe size reaches 0.3 pore volume or more, then development of the section is economically desirable. At the higher level of maximum governing industrywide prices, injection of a polymer is economically effective both according to the criterion of the maximum of the time-adjusted benefit and the criterion of a maximum of absolute national-economic benefit.

Let us note two peculiarities of the polymer flood of a bottom-water drive field. Calculations indicate that, from the economic point of view, it is

more desirable that the method be used at the very earliest stage of development. Actually, variant 2 for type II strata is characterized by maximum values of time-adjusted and absolute profit, although it provides for less oil recovery than variant 3. An increase in polymer-fringe size from 0.5 to 1 pore volume raises final oil recovery insignificantly, but, according to the criterion of maximum absolute national-economic benefit, this variant is preferable, since it occasions a considerable reduction in the amount of produced water.

Conclusions

1. The effectiveness of ordinary waterflood of platform-type deposit VNZ's with oil of increased viscosity can vary over a wide range, depending upon the mutual arrangement of intercalations of various permeabilities that make up the stratum.

2. The use of polymer flood at the initial stage of development stimulates substantial crossflows of oil into a zone with subjacent water, where part of the oil becomes nonmigratory. Sometimes this reduces the final oil recovery, so injection of the polymer at a later stage can prove to be more effective from the point of view of increase in final oil recovery. The greatest effect should be expected where ordinary waterflood effectiveness is especially low.

3. As a rule, the earlier that the injection of polymer solutions is started, the higher the economic indicators for development of a sector. Under certain conditions it is economically desirable to use polymer-solution fringes in the size of up to 0.5-1 pore volume of the stratum.

BIBLIOGRAPHY

1. Levi, B. I. "A Numerical Solution to the Three-Dimensional Problem of the Displacement of Crude by Fringes of Water-Soluble Polymers." [Transactions of BashNIPIneft' [Bashkir Scientific-Research and Design Institute for the Petroleum Industry], No 53. Ufa, BashNIPIneft', 1978, pp 57-59.

2. Berezin, V. M. "Phase Permeabilities of Productive Sandstones for Oil and Water." Transactions of UfNII [Ufa Scientific-Research Institute], No 17. Ufa, UFNII, 1967, pp 30-41.

3. Rukovodstvo po proyektirovaniyu i tekhniko-ekonomicheskomu analizu razrabotki neftyanykh mestorozhdeniy s primeneniyem metoda vozdeystviya na plast vodoy, zagushchennoy polimerami [Manual on the Design and Technical and Economic Analysis of the Development of Oilfields, Using the Method of Stimulating the Formation with Water Thickened with Polymers. RD 39-3-36--77. Kuybyshev, Giprovostokneft' [State Research and Design Institute for the Oil Recovery Industry of the USSR's Eastern Regions], 1977.

4. Ponomarev, S. A., Levi, B. I. and Dzyuba, V. I. "A Mathematical-Economics Simulation for Solving Problems of Research and Optimization of the Process of Physico-Chemical Stimulation of the Formation." Transactions of BashNIPIneft', No 59, Ufa, BashNIPIneft', 1980, pp 105-113

11409
CSO: 1822/276

UDC 622.276.5.001.5

DETERMINING FUTURE OF WATER-ENCROACHED OILFIELDS DISCUSSED

Moscow NEFTYANOYE KHOZYAYSTVO in Russian No 4, Apr 84 pp 47-50

[Article by M. T. Abasov, L. A. Buryakovskiy, E. Kh. Azimov, G. G. Palatnik and Ye. M. Saykin (IPGNGM [Institute of Problems of Deep Oil and Gas Fields]): "A Method for Determining the Dependence Between the Water Encroachment of Wells and Deposits of Oil"]

[Text] In developing multiple-formation deposits of oil, a determination of the water encroachment of the well and of the deposit as a whole allows the working of formations to be controlled and the productive intervals of the profile to be singled out for sampling. With the solution of these tasks, the prospects for well-logging methods, by means of which information is obtained about change in the oil saturation of formations throughout the cross-section of a multiple formation, are promising.

A similar problem was solved previously [2] at the qualitative level of joint interpretation of the data of well-logging and the results of sampling. A methodology was proposed that was based on the use of a set of geophysical parameters and sampling at fields of the Kura Region of the Azerbaijan SSR. However, its application was restricted by the use of empirical functions only within the limits of a single deposit, and by determination of the nature of the wells' water encroachment, and, in so doing, according to four qualitative categories: oil, oil with water, water with oil, and water. Establishment of the water encroachment of the wells according to change of water saturation at the quantitative level presents a more complicated task and requires substantiation of water encroachment as a function of current water saturation of the stratum and the methodology for determining the latter, since, in multiple-formation deposits that are being developed, the water saturation of wells depends greatly upon inhomogeneity of the intercalations that are included in the deposit.

This article examines a method for solving such a task on the basis of the joint use of sets of hydrodynamic and geophysical studies of wells. Target of the studies were multiple-formation deposits of Azerbaijan oilfields that have been under development for a long time. The wells' water encroachment reaches 94 percent.

An uneven displacement of oil by water from various intercalations is characteristic of such deposits. Figures 1 shows the distribution of oil saturation $\sigma_н$

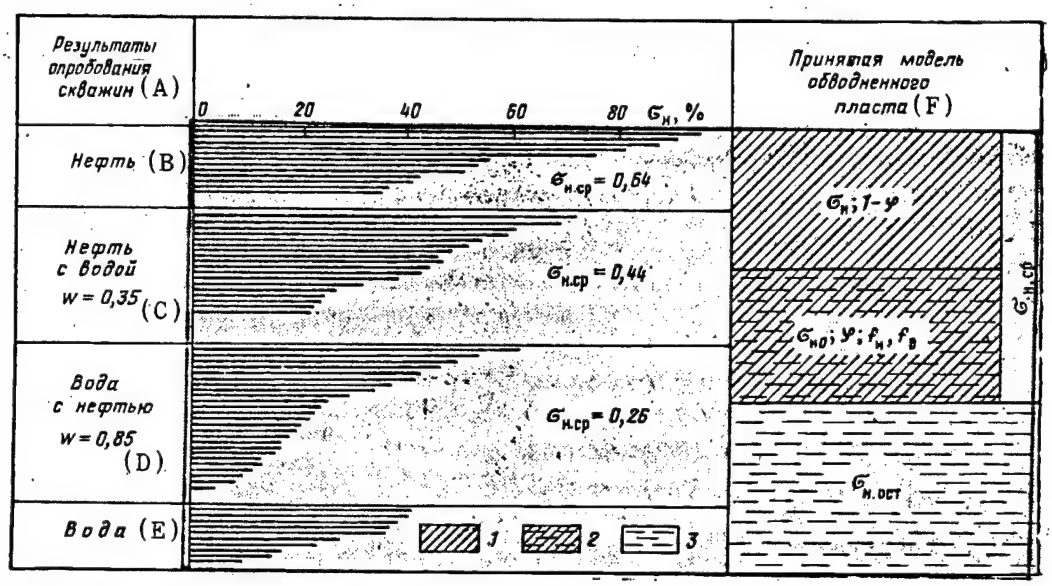


Figure 1. Change in Oil Saturation $\sigma_н$ in Areas of Different Degrees of Water Encroachment for Azerbaijan Fields That Have Been Developed for a Long Time.

1. Oil.
2. Oil with water.
3. Water with residual oil.

$\sigma_{н.ср}$. Average current oil saturation of the stratum.

$\sigma_н$. Oil saturation in the zone of single-phase flow of oil.

$\sigma_{но}$. Oil saturation in the zone of two-phase flow of oil and water.

$\sigma_{н.ост}$. Residual oil saturation.

A. Well sampling results.
B. Oil.
C. Oil with water, w = 0.35.
D. Water with oil, w = 0.85.
E. Water.
F. The adopted model of water encroachment of the stratum.

according to coring in the intercalations of certain Azerbaijan fields that have been under development for a long time that are tentatively broken down by the result of the sampling of wells based upon the four classes of water encroachment. Substantial variations of $\sigma_н$ within the limits of one class of water encroachment and a reduction in the average oil saturation $\sigma_{н.ср}$ during conversion from one class to another are evident from figure 1. Thus, during the displacement of oil by water in the deposits being studied, not only was $\sigma_н$ changed but also the coefficient of scope of the encroachment process ϕ.

In order to determine current water saturation $\sigma_в$ of homogeneous strata that is water encroached, a combined method of the hydrodynamic study of the wells was proposed, with use of the following relationships:

$$\sigma_{в.ср} = \sigma_в \varphi + \sigma_{в.ост}(1 - \varphi); \qquad (1)$$

$$\xi = \frac{\eta_в}{\mu_о(\eta_о - \eta_н)} = \frac{f_в}{f_о - f_н}; \qquad (2)$$

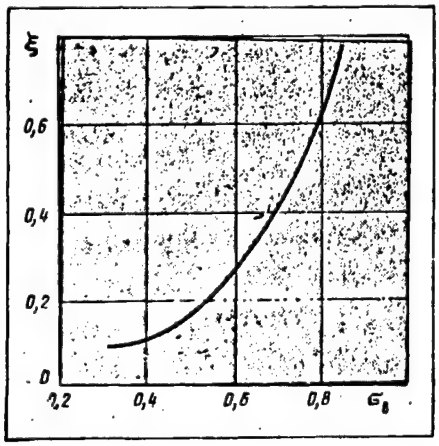
$$\varphi = \frac{\eta_в}{f_в \eta_0 \mu_0}; \qquad (3)$$

$$\frac{\eta_ж}{\eta_0} = \frac{1}{W\left(\frac{1}{\xi\mu_0} - 1\right) + 1}, \qquad (4)$$

where $\sigma_{в.ср}$ is the average current water saturation; $\sigma_{в.ост}$ is the residual water saturation that corresponds to a single-phase flow of oil; ξ is a parameter that depends upon water saturation in the zone of water encroachment; and η_0, $\eta_н$, $\eta_в$ and $\eta_ж$ are, respectively, the initial oil productivity and the current productivities for oil, water and liquid; μ_0 is the viscosity ratio of the oil and the water; $f_в$ and $f_н$ are the relative permeabilities, respectively, for the water and oil in the encroached zone; f_0 is the initial relative permeability for oil; and w is the degree of water encroachment of the well. The use of the methodology of [3] for inhomogeneous deposits with different degrees of water encroachment requires that additional geophysical research be conducted, in addition to hydrodynamic research, in order to obtain information about water encroachment of the various intercalations.

Having available the results of hydrodynamic researched carried out in wells of the PK [reservoir] of the suite of the Buzovny-Mashtagi field (table 1), and the curves of relative permeability [1], and, using the relationship (1), the nature of the dependence of the parameter ξ upon $\sigma_в$ (figure 2) was determined for ξ, $\sigma_в$, ϕ and $\sigma_{в.ср}$ (see table 1).

Figure 2. The Parameter ξ as a Function of the Coefficient of Water Saturation $\sigma_в$ in the Zone of Water Encroachment for Rocks of the PK [Reservoir] Suite of the Buzovny-Mashtagi Field.



It has been established that during the process of development of the deposit, $\sigma_в$ in the washed zones of the strata increased from the initial value of 0.15 to the current one of 0.48-0.86, while $\sigma_{в.ср}$ changed from 0.30 to 0.71, where ϕ = 0.22-0.88. Also, μ_0 increased--from 3.3-6.7 to 15.5, as did w--from 29 to 94 percent. Such changes in the characteristics of the object being developed result from the complicated tectonic structure of the field, the large dimensions of the oil deposit, which stretches out along the whole length of the southern wing of the Buzovny-Mashtagi's anticlinal fold, the layered structure of the collector, and the peculiarities of developing the deposits, which are in the late stages of operation.

Table 1

№ скважины (A)	Участок (B) (C)	$\eta_н$	$\eta_в$	$\frac{\eta_ж}{\eta_0}$	ω, %	μ_0	ξ	$\sigma_в$	φ	$\sigma_{в.ср.}$
		м³/(сут·МПа)								
142	Бузовны, центр (D)	6,9	3,9	1,1	36	3,3	0,36	0,68	0,38	0,39
338	То же (E)	2,7	27,0	2,9	91	10,0	0,37	0,68	0,83	0,60
344	Бузовны (F)	5,5	2,3	0,8	29	3,3	0,15	0,48	0,69	0,40
355	»	7,5	4,2	1,2	36	6,7	0,25	0,59	0,31	0,34
632	Маштаги, юг (G)	3,2	17,6	4,4	84	13,3	0,80	0,86	0,32	0,42
891	Бузовны, центр (D)	2,4	30,7	3,3	93	10,0	0,40	0,70	0,84	0,63
895	Маштаги, юг (G)	3,9	16,2	2,0	62	14,4	0,18	0,52	0,63	0,50
905	То же (E)	8,9	18,0	2,6	77	6,7	0,78	0,84	0,50	0,53
	»	4,6	6,6	1,1	57	6,7	0,18	0,52	0,81	0,47
934	Бузовны, центр (D)	2,8	40,5	4,3	94	10,0	0,56	0,78	0,88	0,71
942	То же (E)	3,7	49,5	5,3	93	10,0	0,77	0,84	0,65	0,62
998	Маштаги, юг (G)	3,0	13,4	3,5	82	15,5	0,50	0,75	0,42	0,44
1004	То же (E)	2,7	31,9	3,2	92	6,7	0,58	0,79	0,80	0,68
1143	»	3,7	5,7	2,0	61	9,0	0,60	0,80	0,22	0,35
1154	»	3,5	1,6	1,2	31	10,0	0,23	0,57	0,22	0,30

A. Well No.
B. Sector.
C. m³/(day.MPa).
D. Buzovny, center.
E. Ditto.
F. Buzovny.
G. Mashtagi, south.

The use of a combined methodology [3] presupposes determination of $\sigma_{в.ср}$ in terms of the relationship (1). For a thin, homogeneous stratum with low water encroachment, this is not difficult. Where there is an inhomogeneous stratified formation, the ratio (1) can be obtained only according to the data of a complex of well-logging studies. The establishment or selection of an electrical model of the stratum with the current degree of water saturation is specific with such an approach. It is necessary to determine water saturation in terms of geophysical data, taking into account hydrodynamic research on a combined method for computing the parameters $\sigma_в$, ϕ and $\sigma_{в.ср}$.

The basis for choosing an electrical model for a stratum being developed and for introducing appropriate corrections into the value for water saturation according to the geophysical data is the expression (1). The methodology for computing $\sigma_{в.ср}$ is determined by the relationship of $\sigma_в$, $\sigma_{в.ос}$ and ϕ. For example, where $\sigma_в = 0.15-0.20$ and there is residual oil saturation, when ϕ and $\sigma_в$ exceed 0.6-0.7, the flushed sections of the stratum and the intercalations with residual oil saturation $\sigma_{н.ост}$ are singled out with sufficient accuracy by electrical logging (BK [lateral logging] and BMK [lateral micrologging]), with focusing of the current. The specific electrical resistance of the encroached intercalations $\rho_п$ and, accordingly, $\sigma_в$, are determined according to BK, in accordance with the formula

$$\sigma_в = \left(\frac{0{,}48\rho_в}{K_п^{1{,}93}\rho_п} \right)^{1/1{,}4}, \qquad (5)$$

where $\rho_в$ is the specific resistance of the water according to data from an analysis of formation water; $K_п$ is the porosity (the function is obtained in accordance with the data of laboratory study of cores of the lower section of the PT of the Apsheron region field).

The porosity of each stratum being worked must be determined by using formula (5), and, for this purpose, radioactive-logging methods (GK (gamma logging] and NGK [neutron-gamma logging]) [4] can be applied. Sampling at the Buzovny-Mashtagi field by a GK-NGK unit indicated great possibilities for using these methods jointly with electrical methods in evaluating the degree of water encroachment of the strata being developed.

The thickness of the interlayers $\Sigma h_н$ with residual oil saturation is found by BMK. The coefficient ϕ is determined as the proportion of rocks with residual oil saturation from the relationship $\phi = (H - \Sigma h_н)/H$ (H is the thickness of the stratum being worked); and $\sigma_{в.ср}$ is found from relationship (1) where $\sigma_в$ and ϕ are given.

In order to determine the initial water saturation $\sigma_{в0}$ and $\sigma_в$, the data of electrical logging of wells that were drilled at the start of development of the deposit (1940-1944) and during the depletion stage (1971-1980) are used. In selecting the wells, the prerequisite of the sameness of the cross-section in terms of lithology and porosity in the wells being worked and those drilled previously is prescribed, and variation in specific resistances in time is ascribed to the results of the depletion of the oilbearing rock (table 2).

Table 2

№ скважины (A)	Интервал опробования (B), м	w, %	$\rho_в$, Ом·м	$\rho_п$, Ом·м	$K_{гл}$, %	$K_п$, %	$\sigma_в$	$\sigma_{в.ср}$
1192	1910—1917	67	0,20	15	10	18	0,45	0,45
1194	1932—1939	80	0,15	6,5—9,5	10—16	21	0,48—0,65	0,54
1196	1846—1862	81	0,14	10—12	10—16	15,5—17,5	0,65	0,65
1198	1912—1920	81	0,16	6,5	10	20	0,50	0,50
1200	1890—1899	81	0,16	9	13	24	0,49	0,49
1204	1842—1860	78	0,16	9—11	10—15	18—19,5	0,55—0,67	0,58

Comment: $K_{гл}$ is the clayeyness coefficient.

A. Well No.
B. Sampling interval, meters.

According to the results of well-logging data interpretation, $\sigma_{в.ост}$ at the start of development changes from 0.07 to 0.19 and, on the average, it is 0.15; $\sigma_в$ increases from 0.35 to 0.67. The content of residual crude,

according to core-study data, changes from 0.01 to 0.38, and, on the average, it is 0.16. During computation of the curves of relative phase permeabilities for the conditions of the PK suite of the Busovny-Mashtagi field, $\sigma_{в.ост} = 0.15$ and $\sigma_{н.ост} = 0.16$ were adopted.

The results of the computations of $\sigma_{в.ср}$, which were carried out in accordance with the electric logging-radioactive logging complex, are cited in table 2 and are shown in figure 3. Curves 1, 2, 3 and 4 were computed according to the Bakleya-Leveretta formula and in accordance with the relationships (1) - (3) and figure 2 data for the various $\mu_о$, taking into account the curves of relative phase permeabilities

$$w = \frac{1}{1 + \frac{f_н}{f_в \mu_о}}. \qquad (6)$$

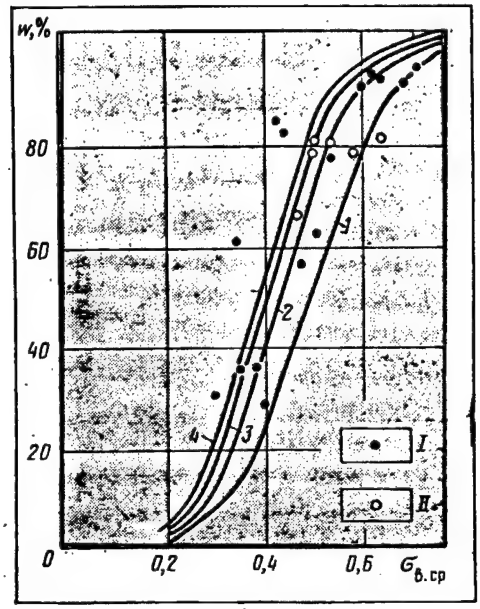


Figure 3. Water Encroachment of Wells as a Function of Average Water Saturation $\sigma_{в.ср}$ of Rocks of the PK [Reservoir] Suite of the Buzovny-Mashtagi Field.

I. Results of hydrodynamic research of wells.

II. Results of geophysical research of the strata and the sampling of wells.

1, 2, 3 and 4. $\mu_о$ are, respectively, 3.3, 6.7, 10 and 14.

It is evident from figure 3 that the majority of the actual points are observed between the computed curves 2-4; curve 3, which corresponds to $\mu_о = 10$, is recommended for practical use. The results obtained with the use of geophysical data are available for an area that is bounded by the computed curves and are in agreement with the results of hydrodynamic research.

Conclusions

1. The dependence between water encroachment of wells and average current water permeability of the formations where there is nonuniform displacement of oil by water throughout the deposit's cross-section can be established by electrical logging (with focusing of the current) and radioactive logging, taking hydrodynamic studies of the wells into account.

2. This dependence permits zones with residual oil saturation to be evaluated and recovery from the wells that will be drilled for the final development phase of the given zone to be forecast.

BIBLIOGRAPHY

1. "Evaluation of Possible Flow Rates of Wells in Zones of Residual Oil Saturation," by M. T. Abasov, E. Kh. Azimov, L. A. Buryakovskiy et al. NEFTYANOYE KHOZYAYSTVO [The Oil Business], No 2, 1982, pp 25-28.

2. Buryakovskiy, L. A., Palatnik, G. G. and Badalov, T. A. "A Nonlinear Method for Forecasting (Diagnosing of Patterns) for Solving Well-Logging Tasks." NEFT' I GAZ [Oil and Gas], No 1, 1981, pp 8-14.

3. Vasil'yevskiy, V. N. "A Field Method for Determining Current Oil Saturation of Productive Formations During the Displacement of Oil by Water." NEFTYANOYE KHOZYAYSTVO, No 5, 1968, pp 26-29.

4. Vendel'shteyn, B. Yu. and Rezvanov, R. A. Geofizicheskiye metody opredeleniya parametrov neftegazovykh kollektorov [Geophysical Methods for Determining the Parameters of Oil and Gas Collectors]. Moscow, Nedra, 1968.

11409
CSO: 1822/276

UDC 622.276.1/.4(571.1)

FURTHER STUDIES OF SALYM OILFIELD'S BAZHENOV SUITE URGED

Moscow NEFTYANOYE KHOZYAYSTVO in Russian No 4, Apr 84 pp 70-72

[Article by V. Ye. Gavura: "Discussion of the Results of Industrial-Test Development of the Deposit of the Bazhenov Suite of the Salym Field"]

[Text] In December 1983 a session of the Section for the Development of Oil and Gas Fields of the Scientific and Technical Council of Minnefteprom [Ministry of Petroleum Industry] convened at Nefteyugansk, at which the results of industrial-test development of the Bazhenov suite deposit of the Salym field were discussed.

Participating in its work were 115 people: staff specialists of Minnefteprom and RSFSR Mingeo [Ministry of Geology], scientists from MINKh i GP [Moscow Institute for the Petrochemical and Gas Industry] imeni Akademik I. M. Gubkin, VNII [All-Union Oil and Gas Scientific-Research Institute], IGiRGI [Institute of Geology and the Development of Minerals], SibNIINP [Siberian Scientific-Research Institute of the Oil Industry], ZapSibNIGNI [West Siberian Scientific-Research Institute for Geological Exploration for Oil], VNIInefteprom geofizika [All-Union Scientific-Research Institute for Geophysical Methods of Exploration for the Oil Industry] and VNIIKRneft', and production specialists from Yuganskneftegaz [Yugansk Oil and Gas Production Association], Glavtyumengeologiya [Main Administration for Geology of the Tyumen Region], the Tyumen Territorial District of USSR Gosgortekhnadzor [State Committee for Supervision of Work Safety in Industry and for Mine Supervision], Yuganskneftegeofizika [Yugansk Trust for Oil and Gas Geophysics] and Nefteyugansk Regional Mine-Engineering Inspectorate. The chief of the Administration for the Development of Oil and Gas Fields of Minnefteprom, V. Ye. Leschenko, led the session.

Deputy General Director of Yuganskneftegaz Association O. M. Moskovtsev presented the report, "The Results of Industrial Test Operation of Wells of the Bazhenov Suite of the Salym Field." The following reports also were heard: "Methods for Evaluating Oil Reserves in the Bazhenov Suite of the Salym Field" (E. M. Khalimov of VNII); "An Evaluation of Bazhenov Oil Reserves Based on the Experience of a Sector of the Salym Field" (V. P. Sonich of SibNIINP); "Operation of the Salym Field Mechanized-Well Inventory" (A. P. Siberev of the Pravdinskneft' NGDU [Oil and Gas Recovery Administration]); "Economic Evaluation of Operation of Salym Field Wells by Operating Method" (N. G. Konev, Yuganskneftegaz Association); "Results of Hydrodynamic Study at the Salym Field" (S. G. Vol'pin, VNII); and "Results of a Well-Logging Study of Salym Field Wells" (V. P. Tolstolytkin, Yuganskneftegazgeofizika Trust).

V. P. Shcherbakov, N. D. Kaptelinin, M. L. Surguchev, I. D. Umrikhin, M. D. Rosenberg, Yu. V. Zheltov and V. Ye. Leshchenko took part in the discussion of the reports.

The results of industrial-test development of the Bazhenov suite deposit of the Salym Field were discussed in detail, basic oil-reserve evaluating methods (volumetric, probability and statistical-reference) and the results of hydrodynamic and well-logging studies of wells of the test section were cited, and operation of the deep-pumping well inventory was analyzed and an economic evaluation of it was given. Moreover, the results of test operations on the drilling of wells, using solutions based upon water and hydrocarbons, were cited that showed that the type of solution does not appreciably affect well productivity.

An expanded complex of geophysical research, including radioactive, side, microside and acoustic logging were conducted in the wells that were drilled. Multiple-probe neutron logging and the method of downhole acoustic television were introduced.

An expanded complex of well-logging studies for opening up Bazhenov sediments enabled additional geological information to be obtained on the nature of the structure and saturation characteristics of the Yu_0 reservoir.

During experimental operation in 24 wells a study was made by methods for thermal and flow-rate measurement, as a result of which the conclusion was drawn that there were several oil-flow zones along the Bazhenov suite profile. In the more productive wells, oil flow from the lower part of the cross-section was observed.

The thickness of the producing intervals was, on the average, 20 percent of the total thickness of the Bazhenov suite. In order to intensify the flow of the crude, hydrofracturing was performed in 2 wells, salt-and-acid treatment in 17. However, both methods proved to be poorly effective.

An analysis of indicators of the operation of exploratory and producing wells testifies that their drainage zone has an impaired connection with the feed zone, which led to a sharp drop in formation pressure and a reduction in flow rates during operation.

In a sampling zone where formation pressure was reduced by 0.1 MPa, oil recovery was 100-fold less than in a terrigenous collector. The average annual coefficient of drop in flow rate for 10 wells that had flowed for a long time was 24.2 percent.

The reservoir pressure in the sampling zone was sharply reduced, and in some wells it became lower than the pressure of the oil's saturation with gas, as a result of which the gas content and the amount of free gas in the formation rose.

As analysis indicated, the rate of drop of formation pressure by well is a function of the total withdrawal of crude. Recovery from high flow rate wells was reduced severalfold (during October 1983, from 252 to 2 tons per day for

well 28r, from 131 to 30 tons per day for well 27r, from 195 tons to 1 ton per day for well 64r, from 47 to 3 tons per day for well 18r, and so on). This testifies to an elastic mode for the deposit and enables statistical methods (the material-balance method) to be used for evaluating the initial and the residual recoverable reserves.

An analysis of the possible methods for evaluating oil reserves that was conducted indicated that, in terms of the degree of substantiation of the source data and reliability of the assessments obtained, the standard-statistical method is more effective, according to which the evaluation of the reserves of the industrial-test section and of the whole petroliferous area of the Salym field is more reliable.

It was established that the inventory of 18 wells that were located in poorly productive areas were operating on an accumulation mode with a period of 2.5 days to 3 months. An analysis of operation of the mechanized-well inventory indicates its poor effectiveness.

Based upon the results of theoretical research and of industrial-test development of the Salym field's Bazhenov-suite deposit that were described in reports and speeches based upon the section and in studies by Minnefteprom's Scientific and Technical Council, the following was noted.

The calculations made by VNII, SibNIINP and the Yuganskneftegaz Association on the factual data of the development indicated that the oil reserves in the deposit are much lower than described earlier.

The results of extended operation of wells at the section that has the best geological characteristics indicate low technical and economic indicators for development of the deposit in comparison with other West Siberian fields and low levels of oil recovery. The productivity and flow rates of the wells of Bazhenov-suite sediments varied sharply throughout the area without any consistency, from hundreds of tons per day to zero (at distances of 250-1,000 meters); 56 percent of the operating well inventory (41 wells) here is being operated with flow rates of less than 1 ton per day.

A decision was adopted, the basic principles of which should guide production and scientific-research organizations in their activity. They call for execution of the following measures:

continue conduct of the expanded set of well-logging, hydrodynamic and geophysical research in accordance with the approved program for operations and studies on determination of optimal drawdown and depth of lowering of pumping equipment for low flow-rate wells;

do work on unloading pressure buildup curves;

restore test operations on water injection at the test element, which called for mandatory plotting of injectivity profiles in the injection hole and of oil recovery in surrounding producers;

jointly with VNIIBT [All-Union Scientific-Research Institute for Drilling Techniques] drill a horizontal hole;

take samples at intervals in the various zones of the Bazhenov suite and the upper portion of the Abalak suite;

jointly with VNII, drill special holes for massive hydrofracturing of the stratum;

SibNIIP and the Yuganskneftegaz Association: make a detailed economic assessment of the profitability of operating wells that have been drilled through in various zones and determine the minimum initial profitable flow rate of the wells;

VNII, VNIIBT, VNIIKRneft', VNIInefteprom geofizika, SibNIINP, IGiRGI, VNIISPTneft' [All-Union Scientific-Research Institute for the Gathering, Treatment and Transport of Oil and Oil Product], NPO Soyuztermneft' [Science and Production Association for Thermal Methods of Oil Recovery] and TsGE Uprneftegeofizika: work out an operating program that calls for all measures for the most rapid execution, in the full amount, of the tasks of the approved Integrated Program; and

SibNIINP, jointly with the Yuganskneftegaz Association: make an analysis of the operation of the mechanized well inventory and validate the choice of the most desirable method for lifting the fluid.

11409
CSO: 1822/276

UDC 622.276.012:621.311.4

IMPROVED ELECTRICAL EQUIPMENT FOR OIL, GAS INDUSTRY URGED

Moscow NEFTYANOYE KHOZYAYSTVO in Russian No 4, Apr 84 pp 73-75

[Article by N. Z. Pokonov: "The Operating Reliability of Electrical Installations in the Oil and Gas Industry"]

[Text] An expanded scientific and technical session of the Power-Engineering Section of the TsP NTO NGP [Central Administration of the Scientific and Technical Society of the Oil and Gas Industry] imeni Academician I. M. Gubkin on the question, "The Operating Reliability of Electrical Installations in the Oil and Gas Industry and Enterprises of Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises]," was held in Moscow in December 1983.

Participating in the session's work were 65 specialists of power-engineering services of enterprises and of scientific-research, design-development, design and training institutes of Minnefteprom [Ministry of Petroleum Industry], Mingazprom [Ministry of Gas Industry], Minneftegazstroy, Minmontazhspetsstroy [Ministry of Installation and Special Construction Work], Glavgosenergonadzor [Main Administration of the State Inspectorate for Power-Engineering Safety] of USSR Minenergo [Ministry of Power and Electrification], Minneftekhimmash [Ministry of Chemical and Petroleum Machine Building] and USSR Minvuz [Ministry of Higher Education].

Urgent problems of increasing the operating reliability of electrical installations of enterprises that recover and transport oil and gas, as well as of gas-treatment plants, were examined.

After hearing and discussing reports called for by the program, the session's participants noted that engineers, technicians and blue-collar workers of the power-engineering services had done much work, jointly with specialists and scientific workers of institutes, to introduce more perfected and reliable schemes for internal and external power supply and new electrical equipment with improved technical characteristics, to improve protective relays, automation and control circuits, and to improve the status of the electrical activity and its execution in accordance with existing norms and rules for arranging electrical installations.

The large-scale introduction at Minnefteprom enterprises of STD and STDP synchronous motors at oil pumping stations (NPS's) and cluster pumping stations (KNS's) for injecting water into formations, which are also used for maintaining supply-line voltage, continues.

Brushless SDBO-99/49-8KhL2 motors and sets for controlling them are being introduced widely at drilling enterprises.

Easily installed ST-7 substations, integrated KTPPN-82 distributing arrangements and integrated KUPNA-500, KUPNA-700 and KUPNA-800 equipment for pumping units have been produced for the electrical supply for oil-recovery and drilling at oilfield sectors.

The output of a new series of high-efficiency submerged electric motors designed for operation at higher environmental temperature has started. Semiconductor-based ShGS-5803 sets have been created for controlling them. Brushless synchronous SDB-type electric motors have been produced and are being tested for the electric drive of pumping-jack installations; and BUS-3M control sets, based upon semiconductor elements, are being introduced for controlling asynchronous pumping-jack motors.

In order to illuminate the NPS's of trunk oil pipelines, reliable and economical integrated illuminating installations (KOU's) based upon slotted light guides made by the Vatra Association are being introduced.

Mobile electrical laboratories made in the GDR are being introduced to service power grids and substations.

With the trunk transport of gas, the use of gas pumping units (GPA's) with STD-12500 synchronous-motor drive is increasing annually. For reserve and emergency electric-power supply for the gas industry, modular integrated BES-630 power stations and GTG-12 gas-turbine generators are being used.

For drilling exploration holes and producers in the shelf zones of seas, domestic jack-up and semisubmerged drill rigs outfitted with electrical engineering equipment that is on a par with the world's best models has been introduced; Minelektrotekhprom [Ministry of Electrical Equipment Industry] and Mingazprom have planned to manufacture and introduce in 1984-1985 offshore underwater 35-kV cable for electrifying offshore oil and gas field installations. The following are in the development and manufacturing stages: 25-MW GPA electric drives with thyristor converter for starting and regulating the productivity of the unit; 4-12.5 MW GPA electric drive with full-head blowers with an air cycle for cooling the motor and with apparatus for air cooling of the oil; fully equipped 35-110 kV transformer substations; and fully equipped 6-10 kV switchgear for regions with cold climates in a version that provides for reliable operation thereof at temperatures of -45 degrees C and lower.

The gas industry has done work to unify design solutions for electric-drive compressor stations, and Instructions for the Design of Electrical Circuit Diagrams for Compressor stations have been worked out. MINKh i GP imeni I. M. Gubkin has carried out, jointly with the Donetsk and Kiev Polytechnical Institutes, research and experimentation on the execution of self-starting for large synchronous machines at trunk gas pipelines, and measures for increasing the operating reliability of West Siberian installations have been developed and approved.

Based on Soyuzenergoremmontazh [Trust for the Repair and Installation of Power Engineering Equipment for the Gas Industry], specialized enterprises for the repair, installation and startup and setting up of electrical installations have been established and are in operation. SNiP's [Construction Norms and Regulations] on the construction of 6-kV overhead lines have been changed in the area of increasing the distance between conductors, shortening anchor spans, and using ferroaluminum wire and suspension insulators; and the distances between the electric-power lines and the trunk pipelines have been increased.

All the indicated measures have helped to increase the operating reliability of electrical installations in the oil and gas industry. At the same time, it was noted at the session that unimproved electrical equipment with low power-engineering indicators is being used at some facilities.

The design of fully outfitted KRNB-6 high-voltage installations has not been worked out adequately; their breakdowns cause outages. The modular principle of installing electrical drilling equipment has not been widely disseminated.

The problem of eliminating axial "walks" of STD-8000 motor shafts and of repairing windings with Monolit-2 type insulation is being solved slowly. The work to improve the adjustable electric drive of NPS and GPA pumps of compressor stations of trunk oil and gas pipelines, the system with a high rate of boosted excitation, and synchronous electric motors for GPA drive with improved rotor reliability, is proceeding slowly. Deficiencies that have been manifested in the operating process in the matter of strengthening the interphase insulation of VE-10 circuit breakers of the KE-10 cell with a nominal current of 3,200 A still have not been eliminated. AVM-20 automatons of the Kontaktor Plant that are used as input and sectional automatons at integrated transformer substations of the department and as automatons for the air cooling of gas do not operate in the circuits for automatic switch-on of the reserve, which reduces the operating reliability of electrical installations, because of design imperfections.

Attributing great importance to the work of increasing operating reliability of electrical installations in the oil and gas industries, further improving the operating process, increasing labor productivity and improving technical and economic indicators, the session of the Power Engineering Section of the Central Administration of NTP NGP imeni Akademician I. M. Gubkin recommended the following:

I. Request the Ministry of Electrical Equipment Industry to:

1) speed up the development and production mastery of the required range of electrical equipment in KhL1 and KhL2 versions;

2) raise the quality of repair of asynchronous and synchronous motors and transformers at specialized plants;

3) develop and master the production of 6-10 kV switchgear for drill rigs which meets the technical level of world standards and has been unified for drilling under various conditions; of 10-kV electrical drilling motors; of DC

motors fed from thyristor converters; of vibration-resistant economical luminaires that use luminescent and mercury-quartz lamps; of hose and control cables with insulation resistant to oil and gasoline, for diesel-drive drill rigs; and of unified connector assemblies for hose cables;

4) solve the question of suppressing overvoltages that arise during the disconnection of synchronous motors with vacuum contactor;

5) require the manufacturing plant to supply plates for modernizing TYe-8-32 exciters;

6) require VPO [All-Union Production Association] Soyuzelektrosvet plants to improve the quality of manufacture of KOU's, especially starter-regulator arrangements and DRIZ-700 bulbs, and also to send complete sets of spare parts for them; and VNISI: undertake monitoring of the solution of these problems;

7) develop and master for the oil-recovery industry the production: a) of transformer substations for electrical supply for wells equipped with submerged ETsN's with voltage of 6/0.4-3 kV and a capacity of 320-630 kW in the KhL1 version; and b) of integrated, modular mobile electrical installations for the current maintenance of wells;

8) develop and master the production of electrical equipment for trunk oil and gas pipelines: a) synchronous motors of 3-8 MW and 6-10 kV with brushfree exciters for awning-type installation; and b) automatic regulators for excitation of high-powered synchronous motors with easily reorganized operating program;

9) master the repair of synchronous-motor windings with Monolit-2 insulation and the output of modernized STD-12500 rotors, synchronous electric motors with air cooling, side input and built-in current transformers; and

10) reinforce the interphase insulation of the VE-10 circuit breaker, which is designed for a current of 3100 A, and of KE-10 cells, and eliminate deficiencies in the AVM-20 automaton.

II. Request the Ministry of Construction of Petroleum and Gas Industry Enterprises:

1) To master the construction of 6-10 kV overhead lines in accordance with the new SNiP's;

2) To raise the quality of electrical installing work, allowing no deviations from design solutions; and

3) To use more widely developments and designs by design and scientific-research organizations of Glavelektromontazh of Minmontazhspetsstroy and by USSR Minenergo that are aimed at supporting industrialized methods for doing electrical installing work.

III. Request the Ministry of Petroleum Industry;

1) to solve the problem of developing instruments for reporting on electric power, with output to the ASU TP [Automated System for Control of Technological Processes]; and

2) to organize for association and administration chief power engineers a seminar on the study of integrated transformer substations, ShGS-5803 control stations and BUS-3M control modules.

The session recommended that work to introduce new equipment in the area of power engineering for the oil and gas industries and to monitor energy resources consumption be improved, that timely and precise transmission of current data to the GIVT's [Main Computations and Information Centers] of Minnefteprom, Mingazprom and Minneftegazstroy be provided for, and that the turnover for industrial operation of subsystems for planning energy consumption for oil and gas recovery and repumping be speeded up.

11409
CSO: 1822/276

QUALITY OF OFFSHORE OIL PLATFORM DISCUSSED

Moscow BYULLETEN' STROITEL'NOY TEKHNIKI in Russian No 4, Apr 84 pp 19-20

[Article by L.V. Kalinin, Senior Expert, Oil and Gas Department, Glavgosekspertiza, Gosstroy USSR: "Need to Improve Quality of Plans for the Construction of Marine Oil and Gas Recovery Facilities"]

[Text] The further growth of the oil- and gas-producing industry in our country will depend, in many respects, on successful development of offshore fields. It must be emphasized that management of oil and gas deposits in the continental shelf fields is a technically complicated and expensive problem.

Considering the importance of developing oil resources on USSR's continental shelf, all oil and gas exploration, prospecting, recovery and transport operations, and the conduct of a uniform technical policy in the development of special equipment and production techniques to carry out these efforts are to be concentrated in one ministry--Mingazprom.

Scientific research and planning organizations of Gosstroy USSR, Minmontazhspetsstroy USSR, Minsudprom and other ministries and departments are participating in the development of equipment to open up the shelf and methods to carry out construction and rig-up operations to erect MSP [stationary offshore rigs--SOR]. In 1982-83, a series of plans for the construction of SOP's were evaluated by the Glavgosekspertiza Oil and Gas Department.

Not only is construction of SOR's and other offshore structures needed to solve this task successfully, but construction of a number of auxiliary onshore projects is also needed. These projects would insure normal drilling operations and operation of oil and gas wells and other offshore installations. Among such onshore projects are: a maintenance base to service drilling facilities, facilities for construction and repair of offshore oil and gas-field structures, berths, docks, bulk oil plants, offshore drilling vessel maintenance facilities, vessels for auxiliary functions etc.

The stationary rig (SP-1), designed by the Gipromorneftegaz Institute, is intended for simultaneous drilling and exploitation of sixteen 3000-meter wells and can be set up in a sea depth of up to 50 meters. For the structure,

a platform with two support blocks is recommended. Stabilization of the support blocks is provided by precast piles with additional anchors. Interiors of the precast piles and all intertubular space is filled with cement. Structural cross-sections of the support blocks and other sections of bearing structures were determined by computer, based on diagrams calculated for the most advantageous combinations of estimated loads.

Aggregate mass of the platform together with crude reserve stocks and materials is 11,700 tons. This includes 7,600 tons of metal structures and about 2000 tons of operating equipment.

Another reinforced stationary offshore platform, (No 5), is intended for drilling seven development wells and can be erected at a depth of 30.5 meters. The platform design is by the Spetsmorneftegazproyekt Institute, based on the wave and wind characteristics of the operations area.

In designing the rig's production members, a basic design from Gipromorneftegaz was used, with reinforced production deck support blocks. As a result, the support blocks can absorb wave loads of up to 10 meters, and windspeeds of up to 40 meters per second. Beneath the crew housing module and the auxiliary compartments deck, a separate substructure is planned, capable of withstanding wave loads to a height of 12.5 meters (1 percent provision) at windspeeds of 56 meters per second. The rig's structural blocks are secured to the sea floor by pin piles and anchors with the pile footing buried to a depth of 80 meters below sea level. The rig's weighs 3,792 tons. Design plans and specifications of other projects examined were put together using standard designs, simplifying technical and construction decisions. Nevertheless, a study of the documents showed common faults for all the plans examined, chief among them being the limited underlying engineering and geological prospecting data. This was true for onshore installations, as well as for stationary offshore rigs.

Stationary rigs erected in the open sea are the most critical and complicated engineering structures in offshore oil and gas recovery. To install rigs of the type being considered, rolled-metal stock of high-strength steel is used. On the work deck the full set of well-drilling and oil and gas recovery machines is placed. A complicated life-support system (heat, communications, water, maintenance personnel quarters, helipad, supply ship berths, etc.), an abundance of electronic equipment, all these determine the high cost of these installations which, depending on sea depth and recovery capacity of the rigs, comes to tens and even hundreds of millions of rubles. This is why their operational reliability and, in particular, their resistance to wave and wind stresses is so important. The selection of the means to stabilize the support blocks of the SOR to the sea floor depends on the soil type and on the design features of the rig.

In the construction plan for SOR-1 there was almost no engineering or geological surveying data for the sea floor areas where the rig's construction was planned. There was insufficient information in the plan to understand

to what degree the bottom soils had been previously studied. This made it impossible to fully estimate the bearing capabilities of the piles, to calculate their horizontal stresses, to predict settling, listing, and support block displacement. In the formulation of the plan, calculated diagrams, accepted load combinations and results of stress calculations for each pile were not cited.

In the SOR-5 plan to drill a cluster of wells, the volume and make-up of completed engineering and geological surveys did not correspond to the requirements of chapter II-17-77 of SNiP [Construction Standards and Rules] "Pile Footings and Design Standards': during surveys, pile well depth was accepted at 60 meters less the depth piles were sunk; during tests, no natural soil samples undisturbed were collected, and there were no field soil research data (static sounding). There was no beta-metering chart or data on currents on the rig construction site.

The approved plan decisions for anchoring SOR-5 to the sea floor require additional study in selecting type and specifications of piles (drilled-in piles, filled etc., their diameter, length and bearing capability).

It has come to light through examination of the SOR construction plans, that departmental normative documents for planning these projects do not cover many of the planning problems nor construction cost estimates.

According to the plan for BPOB [Drilling facilities maintenance base--DFMB], it has been noted that limited underlying data on soil characteristics for the DFMB construction site have been used. The pile length of 16 meters, adopted for building the footings beneath the main structure of the facility (the production facility, mechanical equipment deck, crane tracks), was not supported by the necessary experimental data. It was suggested that additional research on the bearing strength of soils in the area where the DFMB will be set, be carried out. This area is situated between the artificially created and the old shore lines. Then, based on the results, it was suggested that the extent of pile work and the duration and cost of construction be adjusted.

In the plan for expansion and reconstruction of the bulk oil plant and an oil-loading berth, the projected designs for the oil-loading berth deviated from present requirements, to wit: safety measures for navigating vessels were absent, fire-fighting facilities for ships, environment protection, as well as information about stress calculations and engineering and geological survey related to the area where the berth was to be constructed.

Recommendations to improve the quality of project's support documentation and improve the efficiency of the construction services were issued to the examined projects.

Analysis of the commission's evaluation of the construction projects to develop shelf energy resources shows that project designers pay too little attention

to engineering and geological survey issues, especially in under-investigated areas. In light of the above, planning organizations should focus more attention on the engineering and geological preparation of offshore oil and gas recovery, construction projects and consulting agencies should check the quality and completeness of the project data.

12659
CSO: 1822/317

BRIEFS

RYAZAN GAS-FUEL TANKS--Ryazan--Equipment with the brand of the Ryazan Automotive Equipment Plant will enable natural gas to be used more fully as a motor-vehicle fuel, without bringing it to the liquefied state. The serial output of tank sets into which the gas is fed under high pressure has started at the enterprise. As tests of an experimental group of motor vehicles has shown, such fuel is more efficient and atmospheric pollution is reduced to a minimum. One refueling of such a tank covers a 300-km run. It is planned to produce 200,000 such sets at the enterprise each year. [Text] [Baku VYSHKA in Russian 20 Mar 84 p 1] 11409

AIRCRAFT ENGINES AT OIFIELD--Shevchenko--Engines of aircraft that have been written off will enable the recovery of liquid fuel at Mangyshlak oilfield sections to be greatly increased. The oilworkers have adapted them to heating seawater that goes to maintaining optimal pressure in the productive formations. A new complex of water-heating installations with turbine engines was put into operation at the Uzen' field. Each of them is 6-fold more productive than ordinary furnaces. Conversion to the more efficient method for maintaining formation pressure has been provoked by the rising pace of oil recovery on the peninsula. In order to extract the liquid fuel more completely from the ground, the oilfield workers each year pump 50 million tons of heated seawater into the fields. With the boiling moisture, the salt that precipitated into the sediment quickly stopped up the pipes of the heat exchangers and they had to be replaced frequently. The use of aviation turbine engines permits this cumbersome system to be bypassed. Scorching gases directed from the engine's nozzle directly into the boiler brings the water to a boil at once. This technology has still another advantage: the moisture, enriched by the carbon dioxide of the spent gases, squeezes the liquid fuel from the ground more rapidly. [Text] [KazTAG [Kazakh Telegraph Agency]] [Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 22 Feb 84 p 1] 11409

OIL IN KRASNOYARSKIY KRAY--Krasnoyarskiy Kray--The first flows of oil of commercial importance have been obtained at the Sobinskoye gas-condensate field in the Eveni Autonomous Okrug of Krasnoyarskiy Kray. The crude came from the well that the brigade of the young foreman A. Ganzhi was drilling. In commenting on this event, General Director of Yeniseyneftegazgeologiya [Yenisey Oil and Gas Geology Production Association] V. Nakaryakov said: "The road to Krasnoyarsk oil was long and difficult. Fifteen years ago at Taymyr, the Norilsk Mining and Metallurgical Combine obtained the first thousands of cubic meters of gas from the Messoyakha field, which we had discovered in Yenisey

soil. And then there were years of prospecting and failures. Finally, 2 years ago the Sobinskoye gas-condensate field was plotted on the map. And now commercial quantities of oil have been obtained." The geologists' forecast evaluations about the petroliferousness of Krasnoyarskiy Kray's ground were confirmed. An increase each year in the amounts of deep drilling and increased geological and economic effectiveness of oil and gas prospecting work and of scientific research are consistently leading to the opening up of ever newer and newer fields and their involvement in commercial development. Sobinskoye oil is only the start. We trust that the main discoveries still lie ahead of us." [Text] [V. Komorin] [Moscow IZVESTIYA in Russian 31 Mar 84 p 1] 11409

MANGYSHLAK OIL-RECOVERY MILESTONE--Shevchenko--Mangyshlak's oilfield workers achieved a convincing success during the preholiday work drive. Yesterday, a year ahead of schedule, they recovered the 50-millionth ton of valuable raw material since the start of the five-year plan. Three hundred fifty thousand tons of it were recovered above the plan. Such is the result of progressive flushing of the formations with hot water, which enabled an increase in the flow rate of wells that had been fading. Innovators of Mangyshlakneft' [Mangyshlak Oil Production Association] in a short time erected cluster-type pump stations and high-capacity furnaces that work on casing-head gas. The hot water not only raises the formation pressure but it also washes away the paraffin, which prevents flow of the oil to the well's bore. [Text] [TASS] [Moscow TRUD in Russian 26 Apr 84 p 1] 11409

CSO: 1822/276

RETIRED MINERS RETURN TO WORK

Kiev PRAVDA UKRAINY in Russian 31 Jan 84 p 2

[Article by B. Gertsenov: "Return to the Face"]

[Text] Mines in the Krasnoarmeyskugol' Association have attained the highest mining equipment productivity in the Donbass. Equipment here is working at full force on all shifts and there is no shortage of working hands.

We were able to eliminate the problem of key personnel for servicing mechanized faces without the traditional dispatch of messengers to neighboring regions to look for people wanting to become miners. We turned to our own miners who had gone on pension because of age. This was the right place to turn. As you know, upon reaching 50, underground workers have the right to a deserved rest. The mine management, public department activists and key personnel visited many pensioners at their homes. Their conversations covered state benefits provided to pensioner-miners and the advantages they had at enterprises.

At Krasnoarmeysk it had become a rule to send veterans to sanitaria and preventative health centers once a year free of charge, to give them leaves at times convenient to them and most of all give them passes to health resorts. Mines help pensioners in building homes and acquiring automobiles. Mine workers who decide to leave the profession for an easier one are given the possibility of taking appropriate courses.

About 3,000 miners who have already been granted pensions have again returned to their work sites at their old mines. The concern showed them has paid off in additional tons of coal. The association has achieved the basin's longest machine time -- the hours and minutes that equipment is directly engaged in coal extraction. This brought an additional 800,000 tons of fuel over last year's plan.

11574
CSO: 1822/259

MINE DIRECTOR OUTLINES SUCCESSES

Moscow SOVETSKAYA ROSSIYA in Russian 19 Feb 84 p 1

[Article by A. Lyutenko, director, Raspadskaya Mine: "Miners' Maneuver"]

[Text] The collective at the Raspadskaya Mine started the year with a high pressure pace. In January miners extracted 60,000 tons of coking coal above the plan. They are still working at pace setting rates. What is especially important to us about the successes attained? This is not a matter of a single month, but the fruits of searches covering many years.

The Raspadskaya is 10 years old. From the very first days it had an enviable future. The collective set for itself the task of attaining extraction levels unprecedented in the sector. During the first three years the production rates were really hopeful. However, by 1977 the previous forecasts were upset by mining geological conditions. Modern equipment could not stand up against the increasing rock pressure. It was essential to create more powerful complexes without delay

Experimental equipment had to be brought on line at a difficult time. New capacity had been introduced at the mine, and the collective was being rapidly put together. At the beginning of the 11th Five-Year Plan these tasks were, for the most part, successfully completed. The enterprise began to extract 6 million tons of coal annually. Eighty percent of the brigades are now complying to plans. Our very next task is to not have any lagging at all.

Progressive experience has been acquired with the help of collective tutorship. For example, P. Frolov's brigade has for several months in a row been sending a link to a lagging related section. Skills in controlling the machinery are exchanged right at the working face. The joint work accelerates training. The collective has rapidly moved on to intensive working conditions.

We have started giving more attention to "average workers" ["serednyachki"]. Recently we suggested that each brigade begin high pressure duty to achieve maximum loading of their machinery. Unexpectedly, in addition to leaders, those who usually prefer to sit in the background played the role of initiators in the competition. The baton of labor records was successfully passed. Previously unremarkable collectives set five records for the sector, basin and association. The mine began hoisting an additional 2,000 - 3,000 tons of coal daily.

Engineers fervently supported the workers' initiative. Several valuable technical solutions were found which have now been successfully introduced by the majority of brigades. For example, G. Yeremin's collective used a new scheme for coal haulage and draining water from the face. Machine loading increased, while after being among lagging with regard to extraction rates, the brigade confidently moved to the front ranks. P. Frolov's brigade noted an innovation and used it for an infrequent operation -- shifting a complex from one longwall to the next. The shift is not yet complete, but already G. Sukhinin's brigade is using its colleagues' example and preparing for the same highly economical maneuver.

Immediately after the December (1983) CPSU Central Committee Plenum there was a meeting of the Tunnel Drivers Club. Answering the party's call, progressive brigades made a decision to give a "plus two percent" to this year's labor productivity plan. They were supported by tunnel drivers throughout the entire inter-river area. The monthly planned coal extraction per worker at the Raspadskaya Mine is 124.5 tons. The mine collective assumed the obligation to increase this labor productivity by one percent and to reduce production costs.

I often meet with directors of other mines. I know that many coal extraction enterprises now face serious problems. Our collective recently experienced such difficulties, but was able to overcome them. In a decade of work, the Raspadskaya Mine has become a proving ground where not only new equipment, but also new methods of work organization are tested. So we decided to share the experience. After all, the main lesson learned by Raspadskaya's miners is open to all. It is necessary to display more initiative, depend more on one's own efforts and see that every miner shares in the common concern for above-plan coal. Success will come and there will be records.

11574
CSO: 1822/259

HYDRAULIC MINING PROBLEMS AND PROSPECTS OUTLINED

Kiev RABOCHAYA GAZETA in Russian 16 Mar 84 p 2

[Article by A. Kovtun, correspondent: "The Tale is Soon Told...On Some Problems of Hydraulic Coal Mining in the Donbass"]

[Text] The Krasnoarmeyskaya Mine is one of five in the republic where water is used to extract coal. This includes the entire process cycle, from the face to the preparation plant.

Together with V. G. Kapitonenko, the chief technologist, I visited a hydromining section. Small corridors stretch out perpendicular to the strike. They divide the seam into small squares, the so-called crosscuts. In the corner of one of them, a young fellow in rubberized clothing, Nikolay Bruyako, is conjuring over a small mechanism. This is the control panel. A little bit further, in a niche, a "cannon" sprays water at high pressure. The spray is furiously assulting the seam, crushing it and together with the coal, flows in a black stream along an inclined trough to the section hydrochamber.

The coal is moved up to the surface by an air lift. This is a unique installation. Imagine a cup 90 meters deep. It is full of water and slurry. Ten compressors here force along the air which lifts the slurry upward through pipes. It is then moved to a reservoir and the preparation plant. Every hour 6,000 cubic meters of water are supplied to the mine.

I. M. Koval'chuk, a miner brigade leader, explains: "Initially we cut the wall with a Ural-38 combine. Then we wash away clumps of coal. The extraction technology is simple. Even miners without too much experience can control the monitor."

"Hydraulic extraction is a highly productive method. Just compare. In addition to the hydraulic extrction section, which is working a seam 1 meter thick, there is an ordinary longwall. For example, Section No. 7 has a KMK-97 complex to dig coal from a seam a little more than 1 meter thick. Average daily extraction at the water section is 1,352 tons, while at the dry section it is 369 tons lower. Labor productivity in the second section is 10 tons lower."

"However, the main advantage of hydraulic technology is that it makes possible the working of seams down to 30 centimeters thick and to remove coal from steeply dipping seams, up to 68 degrees, in difficult mining geological

conditions with various kinds of deformation. Moreover, the method has few operations, as specialists say, and makes possible the organization of a continuous process flow. Rehandling is often not necessary. If one thinks about the long term, then of all existing technologies this is perhaps the most promising one for extracting coal from a longwall without the presence of people."

"In brief, I am for hydraulic extraction." So Ivan Mikhaylovich summarized our conversation.

This is one opinion, but there is a second which is directly opposed to it.

"Hydraulic mines should be closed down and the Krasnoarmeyskaya completely converted to dry technology." So says Y. G. Aralov, director of the Dobropol'ye-ugol' Association.

What is the problem. Why to the brigade leader and the director have such diametrically opposed opinions?

B. G. the chief technologist at the Krasnoarmeyskaya, explained the situation, "There is nothing strange about it. If, say, you were to ask me whether I wanted to manage a "wet" or a "dry" section, I would, without thinking, select the latter. However, if I were a director I would do the opposite."

"We have 7 mines, 2 of which are hydraulic. These latter give us more trouble than all the others together." added N. S. Ratsenko, the association's deputy technical director for production.

It turns out that miners are constantly suffering from a shortage of spare parts for monitors. For example, at one time, simple bolts were flown by plane from Siberia to the Donbass. Today, such special trips are no longer made, but "tolkachki" ["pushers"] not infrequently have to overcome such distances. I. M. Koval'chuk, whom we already met, has played this role more than once.

Last year the Krasnoarmeyskaya was only 82 percent fully equipped. The director of a "dry" mine can, in an extreme case, turn to a neighbor for help. But if one cannot fine something from anybody, alas!

There is a bad situation with regard to metal supplies for hydraulic transport. The slurry quickly wears out the conduits. Miners have made adaptations to replace them with ordinary chutes from scraper conveyors. Again, this is unfortunate. There is an annual excessive consumption of 400 tons of metal, stocks of which are in short supply.

Because it is sometimes necessary to use different substitutes, equipment reliability is reduced. For example, because special quick connecting pipes are in short supply, miners must make an exception and weld pipes underground. Where there are violations, trouble is not far away.

Every year one of the airlift pipes must be replaced. This means stopping the mine and pumping out the water. Even under the most favorable conditions, coal is sent up to the surface only 282 days a year. As you know, there are always emergency repairs.

Can it be easy on the director in such a situation, when there is an extraction plan and people who must be paid? Moreover, the difficulties are not declining with the passing years. Equipment wears out, fields with gently rolling horizons are depleted and the mine is entering dipping seams. There is no design for its reconstruction.

The technology has not yet been perfected. High energy intensiveness is called a serious obstacle to the introduction of hydroextraction. This is really true.

A. Ya. Kodintsev, scientific research institute chief, explains: "However, in the opinion of many scientists, energy intensiveness is reduced if the mine is made a mixed type. For example, monitors break the coal away from faces, it is hauled in a slurry along the seam, then separated from the water and hoisted to the surface in skips. However, this is only a design. How can its viability be verified? No new hydraulic mines are being opened."

Four years ago the Ukrainian SSR Ministry of the Coal Industry passed a decree, "On Measures to Develop Hydraulic Technology". On 9 June 1982 the order "On a Program for the Development of the Hydraulic Extraction of Coal" was published. Last April P. I. Marosin, deputy minister of the UkSSR Coal Industry, approved a decision of the republic scientific-production commission on the development of hydraulic mining.

However, what is being "developed" is mainly a folder of documents. One gets the impression that hydraulic mining is a green apple putting everybody's teeth on edge. An experiment must be carried out to the end. Any research project requires several stages, each of which is higher than the preceeding one. It can be considered that the first stage of hydraulic extraction is complete. It is necessary to procede. However, this cannot be done without the required attention from the Ministry of the Coal Industry. It is time to move from orders to action.

11574
CSO: 1822/259

ACHIEVEMENTS IN GEOLOGY IN THE UKRAINE LISTED

Kiev PRAVDA UKRAINY in Russian 1 Apr 84 p 1

[Article: "Explorers of the Depths"]

[Text] The explorers of the depths in the Ukraine approached their professional holiday with good technical and economic indicators. This country's fuel base is being replenished with new gas and oil fields, and progressive geophysical methods are being used to detect promising gas- and oil-bearing structures. The five-year quota for the increase in the reserves of apatites--the most important raw material for the production of mineral fertilizers--has already been filled, manifestations of phosphorites have been discovered in the Donbass [Donets Coal Basin], dozens of deposits of peat and lake sapropels have been surveyed and turned over to meet the needs of agriculture, and hydrogeological wells that have been drilled are now producing about 40,000 m^3 of water per day.

"Among the branch's new assignments and areas of interest," says Ukrainian SSR First Deputy Minister of Geology A.I. Zaritskiy, "is the drilling of the ultradeep Krivorozhskaya borehole, which is needed in order to study the geological structure of not only that region, but also that of the Earth's crust as a whole. We are expecting the introduction into operation of a so-called dynamic model of the Crimea; this means an automated system for processing information and predicting geological processes. We are expanding our geological and ecological investigations, particularly near large industrial points. Attention is being given to the protection of arable land against erosion and other negative processes. Geologists are turning to the achievements of scientific and technical progress more and more frequently. We are expanding our contacts with scientists from the Ukrainian SSR Academy of Sciences and departmental institutes. A typical example of this collaboration is the development of scientific principles for predicting the location of deposits of metallic and nonmetallic minerals."

Important initiatives on the part of the geologists' collectives are contributing to the increase in the geological subunits' labor productivity. For instance, in the Poltavneftegazgeologiya [expansion unknown] geological production association, the deep-drilling crew led by USSR State Prize laureate and Foreman M.D. Avramets vowed to fulfill its assignment for the 11th Five-Year Plan in 3.5 years...and kept its word. This initiative was supported by the collectives of 84 deep-drilling crews. The workers at the Geofizpribor

[expansion unknown] plant, who were the initiators of a competition to increase the output of goods for public consumption, are not lagging behind the drillers. Among those who "drive" wells in hard frosts and intense heat, measure off kilometers on the march, and listen to the pulse of the Earth's depths with their instruments, are F.M. Fedorko, a driller with the geophysical expedition; N.P. Pryadun, the chief of the Western Ukraine Geophysical Surveying Expedition's seismic surveying party; P.A. Bashkov, senior topographer of the peat-surveying party; N.I. Nabok, chief of the construction materials party, and many others. Their work experience is a worthy example for their colleagues and everyone who is uncovering the secrets of the Earth's depths and placing their riches at the service of mankind.

11746
CSO: 1822/299

ACHIEVEMENTS AT USSR'S LARGEST COAL MINE NOTED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Apr 84 p 1

[Article by V. Bobrov, correspondent, Mezhdurechensk: "Raspadskaya Millions"]

> [Text] The Raspadskaya mine, the largest in the country, went into operation 10 years ago. Its collective has achieved a result that is unprecedented in the branch: the 50-millionth ton of coal recently came to the surface.

About a year ago, Hero of Socialist Labor V. Yalevskiy, general director of the Yuzhkuzbassugol' [expansion unknown] production association, in commenting on the all-union record of P. Frolov's crew at the Raspadskaya mine, said, "We are gladdened not only by the fact that the collective could extract 11,350 t of coal in a day by using a mechanized complex. Also important is the fact that at the Raspadskaya we are realizing the planned program successfully."

He was talking about the program for mastering the capacities at this country's largest mine that had been developed by the specialists. It proved to be no simple matter. Difficulties arose that had not been suspected by the authors of the plan. First of all, the astonishing diversity and complexity of the geological conditions were discovered. (It should be said that right now they are becoming even more complicated.) As a result, it turned out that the existing facilities for mechanized shaft-cutting and stoping of the coal did not correspond to the actual conditions under which they were used.

The machine builders came to the aid of the miners. They created new and powerful mechanized timbers and cutter-loaders. The mine became a true testing ground for new equipment. In 10 years, 8 types of different timbers have been tested here and 11 have been approved.

"Our foremen with the most experience in mechanized coal mining," says A. Yevtushenko, the mine's deputy chief engineer, "looked at the new complex before it was lowered to the face and saw its weak points. We went to work immediately in order to eliminate them. People learned to make creative use of the new equipment's capabilities."

This April, a month of work with a maximum production load has been declared at the Raspadskaya. During the month, each of the 10 extraction crews must work in this mode for four days. The results of this month's work will make it

possible to plot paths for the further improvement of the coal extraction processes and achieve better indicators.

The miners from Mezhdurechensk already have experience in working under a maximum load. Excellent results have been achieved by the crews of Hero of Socialist Labor V. Devyatko, N. Frolov, G. Kustov and G. Rodionov. However, the individual achievements were not the most important thing. The miners were convinced that they could produce coal in significantly greater amounts by using their modern complexes skillfully.

The first days of the month saw yet another confirmation of the increased mastery of the Raspadskaya miners. V. Gvozdev's crew, for example, extracted 3,000 t of coal in one day, using a KM-130 complex, as opposed to the planned figure of 1,700 t. A. Okunev's crew overfulfilled its plan by a factor of almost 1.5.

Although last year the average production load on a mechanized working face was 1,387 t, in the first quarter of this year it was 1,716 t. More than 150,000 t of coal have now been credited to the miners' above-plan account. The collective is also fulfilling successfully the obligation it took on: to increase labor productivity above the planned level by 1 percent and to reduce the production cost of extracted fuel by 0.5 percent.

11746
CSO: 1822/299

EFFECTS OF GREATER WORK PARTICIPATION BY COMMUNISTS PUBLICIZED

Kiev RABOCHAYA GAZETA in Russian 10 Apr 84 p 2

[Article by A. Zarya, secretary, party organization, Orekhovskaya mine, Krasnodonugol' [Krasnodon Coal Production Association]: "Your Duty, Communist"]

[Text] There is an expression: figures are more eloquent than any words. Well, I want to begin our conversation with just a few figures. During the first months of this year, more than 20 trainloads of above-plan coking coal have left from our mine's spur track. We have never before known such high rates of coal extraction. It is the result of amicable, harmonious work on the part of the entire collective and an effective socialist competition. Every miner at his work place is concerned about not only about how to produce just a little more coal, but also how to do it with less expenditure of labor and means. The miners perceive the party's assignment for an additional increase in labor productivity and a reduction in production costs as their own vital business. Under the conditions present in our mine, it is necessary to extract an additional 7,000 t of above-plan coal and save 56,400 rubles.

These obligations were assumed at meetings in all the labor collectives. In the course of their discussions, the workers and production leaders contributed quite a few specific suggestions for the improvement of production throughout the entire production chain, from the face to loading coal into railroad cars. The Party organization took the fulfillment of the obligations and the introduction of the suggestions that were made under its control.

There are 230 communists at the mine, and they work in the most critical sections. Much that is of instructional value has been accumulated in the work, say, of Section No 3's party organization, which is led by Link Lead V.I. Kvitko, who is a member of M.K. Doroshko's crew. This crew, which uses its mechanized complex skillfully, extracts more than 1,500 t of coal from a single longwall every day. Party groups have been created in three links; they are led by A. Marunevich, Ya. Filipchuk and V. Morskoy. They arranged matters so that every worker has several specialties and knows how to carry out any operation rapidly and well. A competition has been organized among the links for the achievement of the highest labor productivity level and the exemplary preparation of working faces for the next shift. The results of the competition are summed up on a timely basis, which makes it possible to encourage the better workers and correct any shortcomings that have been allowed to creep in. The

use of the principle of wages that take the coefficient of labor participation into consideration also helps raise the degree of activity of each miner.

The basic emphasis in the party office's ideological activity is that all propaganda and agitation facilities be used to reveal to each worker the value of initiative to increase labor productivity by 1 percent and reduce the production cost per ton of coal by 0.5 percent. Every communist was given an assignment: at his work place or in the section assigned to him, insure the maximum coefficient of personal labor participation. Every engineer and technical worker has his own personal creative plan, which stipulates that he be not only a propagandist for the achiements of scientific and technical progress, but also an active participant in the introduction of different innovations into the production process.

In the system of party and komsomol studies and in the communist labor and economic education schools, the propagandists and seminar leaders are now formulating every lesson on the basis of specific examples that show how one collective or another is fulfilling its obligations and what the specific contribution of each worker is. The party office listens systematically to the reports of the secretaries of the section party organizations, the party group organizations and the party organizers on how the communists in their sections are carrying out a leading role in the fulfillment of the assumed obligations and how the lower party elements are affecting the state of affairs in the labor collectives.

The activities of people's control groups and posts, rationalizers and inventors are also constantly in the party organization's field of view. There has been an increase in the demands made of communists who are working on councils of working honor, comrades' courts and the primary organizationof the "Znaniye" Society. Every month, the communists report to the section's party organization and the mine's party office about their personal contribution to the overall state of affairs.

The reports made to the section party organization office, the party group meeting and the crew council help reveal the best experiences, prompt a person where he is not doing his share, and aim him at overcoming difficulties.

In strengthening the everyday political leadership of a collective's life, the mine's party organization is trying, at the right moment, to concentrate its attention on the solution of the primary and urgent problems. Let us say that at one time everything was not going well with the digging of the workings at our mine. The party organization subjected this matter to unremitting monitoring. The goal was formulated in this manner: prepare new longwalls more quickly so that every crew working on an old one was confident that a new one would be ready at the prescribed time. How difficult this was to do, the miners in any mine know from their own experience. It is no accident that many coal enterprises lag behind for precisely this reason, since they do not have a reliable section for face preparation. In such a case, however, how can one conduct a serious conversation about increasing labor productivity and reducing coal production costs?

In our mine we created two mining preparation sections, five cutting crews and one installation crew. In January of last year, the party office heard the report of the then chief engineer, Communist Yu.F. Moiseyenko, about the observance of the schedules for the introduction of new longwalls in place of old ones. In the next month, the problem was enlarged to include the work of the chief engineer's service to support the plan for cutting workings and organizing high-speed work. In August, the party office listened to reports from the secretaries of both preparation sections on strengthening the leading role of communists and increasing the party organizations' alertness.

In November, a report from the new chief engineer, Communist A.I. Babenko (Yu.F. Moiseyenko had become the director of the mine), was heard. Its subject was measures to improve the work of the shafting crews. This was caused not so much by the replacement of the chief engineer as by a desire to be well prepared to work rhythmically from the first days of the new year. The plan for cutting stripping and preparatory workings was not only fulfilled, but overfulfilled. And this was done under conditions where the planned figure was increasing every day. In the first year of this five-year plan, for example, it was 4,335 m, but last year it was 5,900 m.

Now we are hoping to reach the 6-km mark. The plan for the first few months has been overfulfilled.

I dwelt in such detail on a purely technical problem in order to demonstrate how the party organization, having chosen the main link, purposefully achieves a good final result. The final result for the miners, of course, is that they produce more coal with lower expenditures of labor and means. Access to the coal is provided by the cutting of workings. Shaft-cutters are rightfully known as explorers of the depths and they, as has been prescribed for explorers, must be in front. A.I. Saishen's crew is one of the best in the mine. It completed its plan for the first 3 years of the five-year plan ahead of schedule and is now driving workings at a high rate of speed. The cutting crews of F.P. Dumin and Yu.D. Shestakov are working stably and those of V.A. Khikhich and A.Ya. Kharchenko are catching up. The shaft cutters made it possible to introduce the progressive column system for preparing longwalls and working them backwards, and to concentrate the mining work. All the coal in the mine is now being extracted from three complexly mechanized faces with the help of KM-87 complexes. This made it possible to enlarge the mine's planned capacity. It was designed for the extraction of 1,400 t per day, but the plan is set at 2,520 t at the present time and it is being fulfilled successfully. In the years of the 11th Five-Year Plan alone, the coal extraction level increased by almost 31 percent and labor productivity increased by 6.6 percent.

The party organization is concentrating the attention of communists on increasing the intramine transportation system's traffic capacity, opening a path to the coal from a second mine level, using a conveyor network, and not moving it in little, small-capacity cars. This will contribute to supporting the above-plan increase in labor productivity and reduce coal production costs not only this year, but also next year. The people have a saying that "All's well that ends well." And the achievement of a good final result in our work is a most important matter. The communists are not just whistling in the wind.

"All our experience confirms that the most important source of the party's power always was, is, and will be its relationship with the masses, the civic activities of millions of workers, and their proprietary approach to production matters and the problems of public life." These are the words of Comrade K.U. Chernenko, in a speech given at the February Plenum of the CC CPSU, and they were the entire heart of the message received by the collective. And our communists, by their personal example and daily efforts, are strengthening this relationship with the masses.

11746
CSO: 1822/299

COAL

INDUSTRY'S 1984 TASKS SURVEYED

Moscow EKONOMICHESKAYA GAZETA in Russian No 15, Apr 84 p 1

[Editorial: "Miners' Horizons for the Energy Program"]

[Text] One of the most important measures for supplying the national economy with energy resources and improving the structure of the country's energy potential, the Energy Program makes provisions for a substantial increase in coal extraction, primarily through the development of surface methods of working fields. By the time the program's second stage is implemented, such methods will supply 56 - 60 percent of the country's coal, compared to 38 percent in 1980.

As noted in the program's basic points, the Kansk-Achinsk Coal Basin will have an important place in the country's energy balance. KATEK [Kansk-Achinsk Fuel and Energy Complex], the worlds largest such complex, is now being built here. It includes pits with an annual capacity of up to 60 million tons, thermal electric stations of 6.4 million kW each, and enterprises for coal preparation, liquefaction and gasification.

The 26th CPSU Congress decisions state that during the 11th Five-Year Plan there will be pace setting development rates for the most effective surface method, based on the widespread introduction of progressive technology and large unit capacity mine transport equipment. There has been an acceleration of capacity creation in the Kuzbass and the construction of facilities at the Kansk-Achinsk and Ekibastuz fuel and energy complexes.

The comprehensive mechanization of preparatory and extraction operations and improvements in underground transportation systems are key directions for mine modernization. The driving of mine workings by combines will be further developed. During the first stage (up to the end of the 1980's and beginning of the 1990's)its share will reach half of total workings, and by the completion of the second stage (at the turn of the century), it will grow to 65 percent. The comprehensive mechanization of extraction work will be completed by this time. By the end of the second stage's implementation, up to 10 percent of total underground mine extraction will take place without the constant presence of people at mine faces.

Great attention is given to coal quality. Highly productive equipment for automated coal preparation plants should be built during the 1980's and its

installation begin in the second stage. At its end, coal processing will increase 1.5 fold compared to 1980.

The 1984 plan for coal extraction at the country's main coal basins (in millions of tons) is: Donetsk -- 197, Kuznetsk -- 145, Ekibastuz -- 75, Karaganda -- 49, Kansk-Achinsk -- 41, Pechora -- 28, Moscow -- 19, Yakutia -- 8.

In 1984 it is planned to extract a total of 723 million tons, 715.8 million tons of which will be extracted at USSR Ministry of the Coal Industry enterprises. Large problems in the acceleration of production intensification are being solved.

11574
CSO: 1822/259

COAL MINISTER SURVEYS SECTOR

Moscow EKONOMICHESKAYA GAZETA in Russian No 15, Apr 84, p 2

[Article by B. F. Bratchenko, minister, USSR Coal Industry: "Horizons of Intensification"; passages enclosed in slantlines printed in boldface]

[Text] The pace and proportions of coal industry development foreseen by the country's Energy Program over the long term make high demands upon our sector.

The program calls for the accelerated development of the largest fuel bases in the eastern regions: the Kansk-Achinsk and Ekibastuz fuel and energy complexes, the Kuznetsk, South Yakutia, Turgay and other coal basins in East Siberia and the Far East. In addition, the Energy Program foresees further improvements in technical standards and the structure of existing mines through reconstruction and technical reequipment, reductions in the time for construction and the mastery of new capacity and the more complete use of installed capacity for coal extraction and preparation.

Miners have set about implementing the Energy Program. They are armed with the fundamental decisions of the CPSU Central Committee's December (1983) and February (1984) Plena on the economy, and with the points and conclusions in comrade K. U. Chernenko's speech at the February Plenum and to voters.

/The sector's 1984 plan calls for the extraction of 715.8 million tons of coal, 7.7 million tons more than last year. This is a large increase./

Undertaking socialist obligations and counter plans, enterprises in the Ukrainian Ministry of the Coal Industry have resolved to extract an additional 1 million tons of coal, VPO [All-Union Production Association] Kuzbassugol' and Kemerovougol' -- 300,000 tons each, Vorkutaugol' -- 250,000 tons, Krasnoyarskugol' -- 215,000, Intaugol', Rostovugol', Vostsibugol' and Severovostokugol' -- 200,000 tons each, and Karagandugol' and Ekibastuzugol' 150,000 tons each. When one adds up all obligations, the sector's total above plan extraction is more than 4 million tons.

The very nature of this year's socialist obligations is evidence of miner collectives' readiness to put into operation the reserves for intensification.

Miners at the Vorgashorskaya Mine, Vorkutaugol' Association have resolved to tranform their enterprise into a model-demonstration unit with high working and living standards. All extraction and tunnel driving sections have resolved to: keep equipment in a communistic state of readiness, exceeding normed interrepair periods by 1.5 fold, ensuring an annual loading of 500,000 and more tons from the 6 operating comprehensively mechanized faces and high speed tunnel driving in the 4 tunnel driving brigades.

Competing under the slogan: "Every extracted ton of coal -- at minimal losses during preparation", the collective at the central preparation plant of the Komsomol'skaya Association, Donetskugleobogashcheniye [Donetsk Coal Preparation] Association has obligated itself to improve the level of automation, strictly observe technical rules, improve professional skills and use progressive experience in order to exceed planned labor productivity by 1.7 percent and obtain an additional 150,000 rubles profit through reductions in concentrate ash content and coal losses in preparation wastes.

First Quarter work results show that the sector's workers have successfully met socialist obligations for coal extraction and preparation, the development of surface methods and the attainment of above-plan output. At the same time, however, they failed to meet obligations for the combine driving of mine workings and coal extraction from comprehensively mechanized longwalls.

/An essential condition for labor productivity growth is the universal dissemination of progressive experience, above all, that of "1,000 ton" brigades and their followers./

In 1983 427 collectives extracted 1,000 tons daily from a face. They produced 182 million tons of coal and shale, more than 40 percent of all underground extraction. One hundred and two collectives hoisted up 500,000 and more tons each, while the 1 million ton mark was exceeded by 7 brigades and sections headed by M. Reshetnikov, V. Ignat'yev, P. Frolov, K. Markelov, O. Bobrov, V. Litvinov and N. Gladkikh.

At the first of the year there was a meeting of managers of 18 better brigades and sections which had undertaken counter plans, having decided to increase planned labor productivity from 3 to 10 percent and to reduce production costs another 1 percent. The Ministry Board and the Presidium of the Trade Union Central Committee supported the patriotic deed, which is spreading to all basins. The majority of initiators are honorably keeping the miner's word.

The brigade form of labor organization is opening significant reserves for productivity growth. Since the five-year plan's beginning the number of brigades in the sector has increased by 11,000, while the share of workers employed in them has risen to 62 percent. The number of comprehensive daily brigades working on unit contracts and brigades working on time rates has increased 1.6 fold.

At the same time, however, brigades are being slowly set up at enterprises in the VPO Kuzbassugol', and the Kizelugol' and Yakutugol' Associations. Soyuzuglemash's [All Union Coal Machinery Industrial Association] Skopin and Anzhero plants are still among the lagging.

Sometimes brigades are only formally set up and not given the conditions for highly productive work. For example, at the Karagandaugol' and Yuzhkuzbassugol' Associations they began including auxiliary processes in the work volumes of collectives at preparatory and working faces. This would seem to be worth doing. However, they forgot that in this case the brigades must not only be staffed with working face miners or tunnel drivers, but it is also obligatory to have the appropriate auxiliary personnel.

The Ministry Board and the Presidium of the Trade Union Central Committee confirmed a complex of measures to further develop and improve the brigade form's efficiency and to provide incentives to labor in the sector. This especially means brigade cost accounting and contracts.

The level of manual labor, which is still high, is a serious brake on improving labor productivity. More than 80,000 people are engaged in extracting niches, supporting faces and delivering timbers. Very many people are employed at the mine surface.

/Mining science has a great role in accelerating the rates of scientific and technical progress./

In recent years scientific research institutes and design organizations have created and introduced several different kinds of equipment. However, many problems are still unsolved. There is still not effective equipment for extracting coal from thin, gently sloping and steeply sloping seams. In such seams technology must be used which requires large outlays of heavy manual labor. In especially thin seams extraction operations cut into surrounding rock. This means further increases in coal preparation costs.

There are also other major problems resulting from more difficult mining geological conditions. The sector is waiting for effective developments and recommendations from our scientists. Science should not be a contemplator and critic of difficulties in mining developments, but should become an energetic and active assistant.

In 1984 coal machinery building plants should increase the production of mechanized complexes by 30 units, scrapers by 196 units, mine cars by 7,700 and spare parts for underground mining equipment by 10.4 million rubles. It is important that all this output meet the growing requirements of extraction enterprises and be economical and reliable.

The technical standards of preparatory work require special attention. Since 1975 the number of tunnel driving combines at mines has increased by 34 percent and the number of drill units by almost 1.5 fold. There has been a 15 - 20 percent growth in the power available per mining face and in the technical productivity of tunnel driving machinery. At the same time the average rate of tunnel driving has declined. What is the reason for this?

Time and motion studies show that the intrashift idle time of tunnel driving brigades at combine faces is now almost 20 percent of the total shift.

Unproductive losses of work time can be reduced through the creation of specialized brigades and services for preparing supports, assembly and disassembly work and delivering materials and equipment to preparatory faces, but this only diverts large numbers of tunnel drivers to auxiliary work.

/A lot depends upon the initiatives of engineering-technical workers and enterprise managers./

The Zyryanovskaya Mine in the Yuzhkuzbassugol' Production Association is a vivid example of this. It increased annual production capacity from 600,000 to 2.5 million tons through the use of internal reserves. At the Nagornaya Mine in the Kuzbass, measures to specialize production sections and maximize work concentration reduced the number of working faces from 7 to 3 and simultaneously more than doubled the loadings. The mine's annual capacity has increased from 1 million to 2 million tons.

Under intensified operating conditions we have started to strictly require that association and enterprise managers simultaneously improve quantitative and qualitative indicators. Not only output volume, but also increases in labor productivity, reductions in production cost and the size and rate of profit are now also important.

All this requires constant professional activity and socialist entrepreneuralism from managers and specialists. Professional, political and economic education helps give cadre a taste for finding reserves and formulating a new type of economic thinking. We place special importance upon training mine foremen.

If a manager cannot or does not want to restructure work in a new manner, the Board of USSR Minugleprom [Ministry of the Coal Industry] draws the most serious conclusion. Thus, the management of the Leninskugol' was recently consolidated [ukrepleno]. Measures are being taken to vitalize the economic and managerial activities of the Gidrougol' Association.

/Surface mining organizations are solving important problems this year./

In recent years the average annual growth of overburden stripping operations has been only 1 percent. This is four fold less than coal extraction growth rates, and has led to a significant reduction of prepared reserves. In 1984 stripping work volume must be increased by 10 percent and reach 1.2 billion cubic meters. Coal extraction by the surface method is growing by 9 million tons.

In accordance with Energy Program targets, the sector is increasing its capacity for coal extraction by surface methods. While the overall increase for USSR Minugleprom's 1984 construction volume plan is 15.4 percent, for projects at Ekibastuz the figure is 33 percent and for the Kansk-Achinsk Fuel and Energy Complex it is 32.5 percent.

In South Yakutia efforts and resources are concentrated on the introduction of capacity for processing 9 million tons of coal annually at the Neryungri coal preparation plant. This is one of the most important and difficult projects in the sector in 1984. There are sharp increases in construction programs for the Primorskugol' and Vostsibugol' Associations and the Pechora Basin.

The utilization of capital investments takes into account specific features and development prospects of associations and enterprises. At the VPO Kuzbassugol' more than three-fourths of the construction-installation work volume goes to reconstruction, technical reequipment and the support of existing capacity; while at Kemerovougol' 70 percent goes to the construction of new enterprises.

The party and government are giving great attention to miners' social needs. As is known, during the 10th Five-Year Plan the work week was reduced to 30 hours. Wages in the coal industry have increased since 1981. Large volumes of housing and cultural-service construction are under way. Thus, in 1984 it is planned to introduce 2.3 million square meters of housing, 200,000 square meters more than last year.

Under present conditions, extracting more coal is only half the problem. The planned levels must be reached with minimal outlays and the assurance of highly productive labor at each work site. We are striving to do this.

11574
CSO:1822/259

LEADING AND LAGGING ENTERPRISES NAMED

Moscow EKONOMICHESKAYA GAZETA in Russian No 15, Apr 84 p 2

[Unsigned Article: "Going Forward -- Lagging"]

[Text] Going Forward

The Vorkutaugol' Association

On 27 March miners in the Vorkutaugol' Association were the first in the sector to fulfill the quarterly extraction plan. The Komsomol'skaya, Tsentral'naya, Promyshlennaya and Severnaya produced an additional 215,000 tons.

Socialist obligations are being met at pace setting rates by the sections led by comrades Burkov, Pshenichnikov and Baranov and the tunnel driving brigades of comrade Sakharov, Akin'shin and Tatarnikov. The miners in the section led by comrade Burkov obligated themselves to extract 1 million tons of coal in 1984. They were ahead of schedule in the First Quarter. Effective competition for extracting at least 1,000 tons of coal daily from each working face has spread throughout the association.

The Kapital'naya Mine

The collective at this Yuzhkuzbassugol' Association mine was among the first to assume 1984 obligations to increase labor productivity 1.5 percent above the plan and reduce extraction prime costs an additional 1 percent. It was decided to hoist up 100,000 tons of coking coal in addition to the annual program. The First Quarter's results show that the miners' deeds are matching their words.

During January - March the extraction plan was supplemented by 64,000 tons of coking coal. The labor productivity target was exceeded as planned and prime cost reduced an additional 2 percent.

The Mine Administration imeni the Gazeta "Sotsialisticheskii Donbass"

Prior to their merger into one administration with the Mine imeni the newspaper "Sotsialisticheskiy Donbass", the Zapereval'naya and Glubokaya Mines were working unsatisfactorily. In 1983, however, the mine administration produced 263,000 tons of coal above the plan.

There are 12 faces in operation here, 8 of which are comprehensively mechanized. Three longwalls are producing 1,000 and more tons of coal daily. The First Quarter's above-plan output was 16,000 tons.

Highly productive equipment is being fully used is fully used at the mines. Precise organization of work and concern about timely preparation of working faces serve to guarantee success.

Lagging

The Kharanorskiy Surface Mine

During the First Quarter the Kharanorskiy Surface Mine (Director B. Borodin) in Chita Oblast was more than 100,000 tons of coal below plan. This lagging was caused by the unsatisfactory technical servicing of bucket wheel excavators used for extraction and equipment used for overburden stripping and also by the unsatisfactory organization of work.

The deterioration in this mine's activities had an effect on the indicators of the entire Vostsibugol' Association, which was 50,000 tons behind its quarterly plan

The Berezovskaya Mine

Poor engineering support for work in sloping fields and shortcomings in the organization of competition among "thousand tonners" have led to the Berezovskaya Mine (Director V. Tkachenko), Severokuzbassugol' Association not fulfilling its First Quarter Plan. The shortfall is 85,000 tons.

This must be made up in the immediate future. In order to do this, it must, with the association's help, speed up the delayed reconstruction of the enterprise.

11574
CSO: 1822/259

GOALS OF STAKHANOVITE MOVEMENT RECALLED

Kiev PRAVDA UKRAINY in Russian 24 Apr 84 p 1

[Editorial: "Like Stakhanov"]

[Text] Dear readers! You undoubtedly agree that our every day working life would be pretty lackluster if beside us there were not true production enthusiasts who are in love with their profession and are initiators of good things. Their initiatives are based on a knot of skillfulness, heartfelt efforts and human morality. They are always emotional and forthcoming: "Do as I do--do better than I!" In showing initiative, the innovator strives for the highest possible labor productivity.

Let us compare two notable events in the heroic chronicles of socialist competition. Although almost half a century separates them, they are very similar, for they are both based on the highest manifestation of political consciousness and productive activity of the Soviet citizen--the master of his own fate and the owner of his own country.

On the night of 30-31 August 1935, on the basis of a new organization of labor at the face, Aleksey Grigor'yevich Stakhanov, a face worker at the Tsentral'naya-Irmino mine, achieved a productivity level unseen until then: he produced 14 times the normal amount of coal on his shift!

On 21 April 1984, having taken the watch in honor of the 114th anniversary of V.I. Lenin's birth, the integrated crew led by Vladimir Ivanovich Ignat'yev at the Krasnolimanskaya mine of the Krasnoarmeyskugol' [expansion unknown] achieved the highest productivity ever seen in the coal industry: in one day it sent 10,513 t of coal to the surface!

Each of these records can be characterized briefly: inspired labor. Such labor--and let us remember the initiators of Communist Saturdays, shock workers, the Stakhanovites of the prewar years and examples from our daily life--always has been and is now the property of working people who love to work and know how to do it well.

The power is engendered in movement and the passionate desire of each of us to surpass his achievement of yesterday and exceed the boundaries set by innovators. The Soviet people, educated by the Party in the good traditions of A. Stakhanov, N. Izotov, M. Mazay, P. Angelina and other legendary heroes of the

preceding five-year plans, are fully resolved to further accelerate scientific and technical progress, strengthen labor and State discipline, and insure a confident increase in labor productivity.

"Continuity is not an abstract concept but a real, living thing," said Comrade K.U. Chernenko, general secretary of the CC CPSU, at the February Plenum of our party's central committee, "and its essence is primarily that we go forward without stopping. Go forward, relying on all that has already been achieved, enriching it creatively, concentrating collective thought and the energy of communists, the working class and the entire nation on unsolved problems and the key problems of the present and the future."

A clear manifestation of the correctness of the great Soviet traditions was the initiative of the labor collectives of the coal and metallurgy industries and other branches of the national economy for the development of socialist competition for the fulfillment of the assignments for the 11th Five-Year Plan, according to the most important indicators, by the 50th anniversary of the Stakhanovite movement, which will be celebrated in August 1985.

In supporting this initiative, the CC CPSU Politburo charged Party, Soviet, trade union and Komsomol agencies with doing the work necessary to disseminate it widely throughout the country and to make active use of Stakhanovite traditions in order to achieve high production indicators and educate the workers.

This organizational work, which is very important for the successful fulfillment of the assignments formulated by the 26th CPSU Congress and subsequent CC CPSU plenums, is taking great turns in our republic. The miners at the Oktyabr'ugol' association's Kommunist mine have vowed, by 30 August 1985, to complete their 5-year assignment for the extraction of fuel and to save 3 million rubles by reducing fuel extraction costs. This year, plans have been made to raise the daily production load for the entire mine to 500 t.

The labor collectives of the Elektronmash production association, in Kiev, have set high goals for themselves that are just as specific and in the Stakhanovite tradition. Other collectives that have done the same are those of the ore administrations imeni F. E. Dzerzhinskiy and imeni S. M. Kirov in Krivorozh'ye, the crew of the cargo ship Sovetskiye Profsoyuzy of the Black Sea steamship line, and many others. In the birthplace of the movement along--the city of Stakhanov in Voroshilovgrad Oblast--more than 250 collectives of enterprises, shops, sections and crews and about 5,000 production leaders and innovators have taken it upon themselves to fulfill the assignments for the 11th Five-Year Plan, according to the most important indicators, by 30 August 1985.

It is very important that, having approved the initiative of these collectives and workers, the local party, soviet and public organizations plan to implement specific measures aimed at the further development of Stakhanovite traditions and the strengthening of their role in the education of workers, with special emphasis on the young ones. This is totally correct! Recalling his legendary night, Aleksey Grigor'yevich Stakhanov wrote, "The soul of the experiment was the party organization. The light from its drawer illuminated my bench clearly.

This was deeply symbolic: at the sources of the new movement that soon came to be called 'Stakhanovite' stood the communists."

Productivity. Efficiency. Quality. Today the party is pushing these goals to the leading edge. And on how we deal with them depend both the power of our country and our personal prosperity. As far back as the beginning of Soviet power, V.I. Lenin said that every conscientious worker must feel himself to be not only the master in his own plant, but a representative of his country. If it is created in every worker in a collective, such a feeling will enable us to work only like Stakhanov in the final stage of this five-year plan, bring to life successfully the decisions of the 26th CPSU Congress, greet the new party congress worthily, and prepare for whatever we have to do right now.

Initiative and creative participation in labor and public life--this is our main indicator, dear readers, of your ideological maturity. In affirming such an attitude toward labor, the party organizations should be more concerned about the leading role of communists in the development of Stakhanovite innovations. In order to achieve the goals set by the labor collectives, it is important to use all forms of work in the very rich party arsenal.

The Stakhanovite watch will undoubtedly be of great service in fulfilling and overfulfilling the plans for this year and the five-year plan as a whole and will create a good foundation for highly efficient work in the next, 12th Five-Year Plan.

Let the words of the fiery slogans of the CC CPSU ring in every heart: "Workers of the Soviet Union! Enlarge the socialist competition for improving production efficiency and product quality! Let us fulfill and overfulfill the plan for 1984 and the assignments for the five-year plan as a whole!"

11746
CSO: 1822/299

POWER MINISTRY'S INVOLVEMENT IN LIQUID FUEL PRODUCTION EXAMINED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 13 May 84 p 2

[Article by B. Pichugin, head, Coal Industry Sector, Krasnoyarsk Kraykom, Krasnoyarsk: "Having Deviated From the Plan"]

[Text] The reason for traveling to Krasnoyarsk TETs-2 was, it seemed, a happy one: at the end of last year, the main building for an ETKh-175 power engineering coal processing installation was built there, with two departments--gas purification and tar condensation. Experimental work was done on inert materials for 2 months. After that, tuning of the basic production equipment began. This means that the day when the installation will begin working on its planned raw material--brown coal from the Borodinskoye deposit--is not far distant.

"Yes, the little pieces of coal will soon start rolling in," confirmed Aleksey Sergeyevich Ol'khovskiy, the TETS's deputy chief engineer. However, I did not sense any particular enthusiasm in his voice. The reasons for this restraint will become clear if we recall the intentions of the scientists from the Power Engineering Institute (ENIN) imeni G.M. Krzhizhanovskiy.

They based this production unit on the method of rapid pyrolysis, as a result of which the low-calorie brown coal should be converted into gaseous fuel, enriched solid fuel and tar. In this group, the tar is of particular importance: from it the scientists proposed to produce synthetic liquid fuel and a number of valuable chemical products. Preliminary calculations showed that for the ETKh-175 unit's determined capacity, the synthetic fuel produced by it will be no more expensive than that obtained from Tyumen' oil.

"And where will the tar be processed?" I ask Ol'khovskiy.

"In the TETs's furnaces," he says reluctantly. Then, sensing how discouraged I am by his answer, he explains: "But what will they have us do with it if it doesn't burn? The construction of a reprocessing shop is really not provided for in the plan. And there is no room for one here at the TETs."

What is going on here? The installation was planned and built precisely for the sake of producing synthetic liquid fuel. But, as it has now turned out, for the final conversion process there is neither a plan nor a place. How could this have happened? In order to answer these questions in detail, it is necessary to unwind several kilometers of correspondence, decisions and

agreements. However, the main reason for the unsuccessful start of the ETKh-175 can be seen without any effort.

The plan and the execution began to diverge, like scissor blades, as far back as when USSR Minenergo [Ministry of Power and Electrification] ordered its own institute to plan the installation, based on the principle "Do something, but I don't know what..." No, the fault does not lie with the inventors of the technology, ENIN's scientists, who were led by USSR Academy of Sciences' Corresponding Member Z. Chukhanov, because they worked it out skillfully and, one must assume, professionally. However, the main thing is that by its profile, the very essence of this technology is that its final product turned out to be far from "pure" power engineering and its interests. Coal pyrolysis is chemistry, with all of its related complexities. In no way can it be entered in Minenergo's "profile." Indeed, the production of liquid fuel is not one of its obligations. Is that not why the branch's leaders with such lightheartedness, emanating from a lack of knowledge of all the intricacies of this new matter, gave their word a number of years ago to build the ETKh-175?

SOTSIALISTICHESKAYA INDUSTRIYA has already raised the question of whether or not the assignments under the integrated scientific and technical program for synthetic fuel are threatened with ruin. In response, the leaders of Minenergo reported, as far back as June 1979, that they had implemented measures that would insure the introduction of the installation into operation in 1980. Two years later, however, when speaking at a practical scientific conference in Krasnoyarsk, USSR Minister of Power and Electrification P. Neporozhniy again spoke about the "upcoming" introduction of the ETKh-175. It was turned over for operational use, as has already been stated, only in December 1983. Even then, the most important part of the technology was missing.

When the planning studies showed that there was nowhere to "attach" the liquid fuel production shop, the wildest fantasies came to the fore. For example, the scientists suggested that additives for turbine oils be produced from the tar. However, no one could say where this was to be done, or with what facilities and by what processes. Other more realistic ideas were advanced: for example, the construction of a brick fuel factory and the utilization of the tar to produce domestic fuel. For some reason, however, the sobering thought that all these suggestions were taking the prospective matter away from the path outlined in the main assignment occurred to no one. And the goal itself, as formulated in the decisions of the Party's 26th Congress, is the integrated processing of the brown coals from the Kansko-Achinskoye deposit.

Another production installation--the ST-75--that is being built at the Berezovskiy pit is following the same thorny path. It was developed by specialists from USSR Minugleprom's [Ministry of the Coal Industry] Institute of Mineral Fuels (IGI). It was expected that things would go more successfully there, because the installation itself is simpler and there is less construction and assembly work. However, those hopes were not justified. How could they be, when even the planning estimates for the installation have still not been completed and issued? And the part that has been done is full of flaws and unfinished work. Construction has been going on since 1982, but the organizations that are to develop the detailed drawings and the producer plants for the pipe units have still not been named. Grozgiproneftekhim [probably

Groznenskiy State Institute for Design of Petrochemical Facilities] added to the turmoil: the outfitting organizations returned for further work the requisitioning documentation for equipment that had been formulated for them. As a result, the delivery of this equipment was delayed from last year to this year. Now, in the 1985 [sic] start-up year, we can expect a Tower of Babel at the construction site.

The question can be raised: where are the managers of these construction projects looking? What are their engineering and technical personnel doing? Who is actually responsible for breaking the chain? The answer, unfortunately, is not simple, because the services called upon to direct the construction, adjustment and mastery of the new installations do not exist, for all practical purposes. How, for example, can one reproach TETs-2's A. Yangulov for monitoring the construction of the ETKh-175 poorly? According to the staffing schedule, he is actually the chief of the boiler shop. A little more than 40 workers and engineering and technical personnel work under him. All the other services--repair, measuring and monitoring instruments, automatic equipment--are centralized. For them, the TETs is the main thing, because everything (even bonuses) depends on its operating indicators. For them, the ETKh-175 is simply "attached" to their power station.

Indeed, can one really count on success when in neither the Krasnoyarskenergo rayon administration or the Krasnoyarskugol' production association is there a single specialist whose knowledge in the field of chemistry goes beyond the framework of courses at the power engineering, mining, or construction institutes? Chemists are not provided for in the staffing schedules. However, in order to service the many units that go to make up the ETKh-175 it is necessary to have people in professions that simply do not appear in Minenergo's job and wage rates classification manual. The situation is no better with the ST-75: Grozgiproneftekhim did not even issue the technical regulation that would have made it possible to develop a program for personnel training.

One would think that the creators of these installations--the scientists of ENIN and IGI--could have shown more persistence and a greater sense of principle. Indeed, they should not be indifferent as to how they are brought to life. Judging by everything that has happened, however, the institutes considered their mission to be fulfilled. The only thing the scientists do not refuse to do is to take part in consultations and on councils and to give their expert opinions on the projects.

An impression is being created that the goal of producing liquid fuel and chemical products from coal is now somewhere in "no man's land." Misgivings about this have been expressed for a long time. There was also no lack of different proposals. One of them is indisputable: the responsibility for the outcome of this affair should be concentrated in the hands of a single department. Without this, given the present "division of labor"--where the construction of the installations, the development and production of the equipment is scattered among different branches, and the new technologies do not correspond to the profiles of the ministries introducing them--the solution of the problem can stretch on for many years.

In our opinion, the first thing to do would be to create a scientific production association, followed by a subbranch devoted to the development of coal chemistry. This can be done within the framework of Minugleprom or any of the ministries with a chemical profile. The scale and importance of the problem of obtaining liquid fuel from coal deserves this.

11746
CSO: 1822/299

MOBILE SHAFT-CUTTING EQUIPMENT ENTERED IN PRIZE COMPETITION

Moscow EKONOMICHESKAYA GAZETA in Russian No 19, May 84 p 12

[Article: "Mobile Equipment for Mine Construction"]

[Text] USSR Minugleprom [Ministry of the Coal Industry] and Mintyazhmash [Ministry of Heavy and Transport Machine Building] and the central committees of the workers' trade unions of these branches have entered the competition for the USSR Council of Ministers' 1984 prize for the "Complex of Works for the Creation and Widespread Industrial Introduction in Mining Construction of Mobile Shaft-Cutting Equipment." This is the result of the conduct of scientific research (more than 40 subjects) and experimental design (45 pieces of equipment) work and organizational measures that have been implemented.

The equipment has already been used to sink 122 mine shafts during the construction and modernization of 89 mines in the Donets, Kuznetsk, Pechora and Karaganda basins. In insures a reduction in the amount and labor-intensiveness of construction and installation work by a factor of two or three, increases labor productivity by a factor of 2-2.5, and shortens mine construction time by

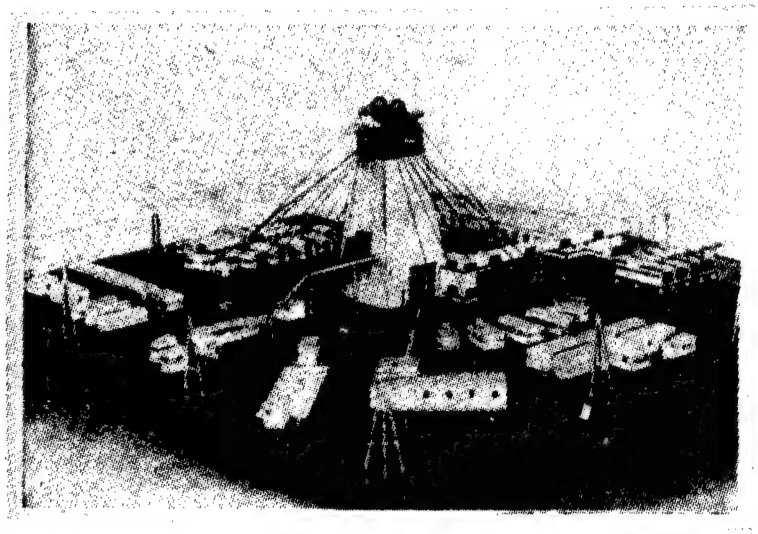


Photo shows new mobile mine construction equipment.

6-8 months. The poorly mechanized labor of construction workers who are cutting shafts is being replaced by the highly mechanized labor of assemblers.

Both ferrous and nonferrous metallurgy have added this mobile equipment to their arsenals. The overall effect in USSR Minchermet [Ministry of Ferrous Metallurgy] alone was almost 50 million rubles.

11746
CSO: 1822/299

BRIEFS

FRUNZE MINES--The first Communist Saturday was held in the mining town of Kyzyl-Kiya in southern Kirghiziya in 1920. In the years since then the town has changed unrecognizably and industry has been widely developed. A shoe factory, cannery, construction materials combine and other enterprises are working here. However, coal is still the main sector. Miners at the Kyzyl-Kiya Mine Administration were the first to respond to the Muscovites' call for such a Saturday. For this day they resolved to extract more than 3,000 tons of coal, remove more than 25,000 cubic meters of rock and drive tunnels the length required. These figures considerably exceed the planned target. The good traditions of fathers and grandfathers has been honorable carried forward by sons and grandsons. [By P. Laptev] [Text] [Moscow SOTSIAL'ISTICHESKAYA INDUSTRIYA in Russian 24 Mar 84 p 1] 11574

UKRAINIAN WORK -- The high pressure work of miners and their very active work are shown in the daily reports of the Ukrainian SSR Ministry of the Coal Industry: since the beginning of the year miners in Donetsk Oblast have extracted 250,000 tons of coal above the plan. They have thereby fulfilled obligations assumed in honor of the forthcoming elections to the USSR Supreme Soviet. There are 12 coal production associations operating in the oblast, 9 of them are ahead of schedule. Collectives at the Donetskugol', Krasnoarmeyskugol', Sovetskugol' and Shakhterskantratsit Associations have shipped the most additional coal to metallurgical plants and electric power stations. Continuing this high pressure duty, progressive collectives are increasing their above-plan accounts. [By RATAU] [Kiev RABOCHAYA GAZETA in Russian 16 Feb 84 p 1] 11574

KARPINSK RESULTS--Karpinsk--Miners in the Vakhrushevugol' Association have sent customers 15,000 tons of coal above the plan since the year's beginning. This is considerably ahead of the production schedule. This year all units here have intensified the struggle to improve labor productivity. Nineteen excavator and locomotive crews have exceeded the sector's output standards. The collective is overfulfilling its counter plan for this indicator. [By A. Mal'tsev] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 18 Mar 84 p 1] 11574

NEW LONGWALL--Donetsk--A completely mechanized longwall has produced its first coal at the Trudovskaya Mine. It was set up for the section led by I. I. Strel'chenko, who has twice received the Hero of Socialist Labor award. The plan calls for the longwall to produce 1,200 tons of coal daily. Miners are forcing

their pace to surpass the 1,500 ton mark. They are mastering the new longwall under the leadership of a new brigade leader, A. B. Vashchilin, who has replaced A. D. Polishchuk, Hero of Socialist Labor and a well known master of high output, who moved on to another section. This year the brigade has resolved to increase labor productivity an additional 3 percent and thus produce 40,000 tons of coal above the target. [Text] [Kiev RABOCHAYA GAZETA in Russian 26 Feb 84 p 1] 11574

BOGATYR' MINE--Ekibastuz, 19 Dec--Miners at the Bogatyr' pit are rapidly developing its underground riches. Today they extracted the 50 millionth ton of coal since the first of the year. The enterprise has reached planned capacity. The consolidated comprehensive brigades led by the communists V. Sakharov and R. Fetser won the right to dispatch the jubilee tons. These collectives are made up of powerful bucket wheel operators, railroad track layers, drillers, blasters and bulldozer operators. Each of them has mastered 2 or 3 related specialities. The progressive brigades have become a school for many miners. The pit's collective plans to send electric power stations at least 2 million tons of coal above the plan by the year's end. [Text] [Moscow TRUD in Russian 20 Dec 83 p 1] 11574

NEW SHAFT--Donetsk--A reliable replacement for mines completing their service life is being prepared in the Donbass. Yesterday at the Shakhterskaya-Glubokaya, one of the new projects, installation work was completed on one of the country's deepest shafts with cage winding. Equipped with powerful underground machinery, it and 4 other shafts will extract 2,100,000 tons of anthracite annually. [Text] [Moscow TRUD in Russian 25 Jan 84 p 1] 11574

NEW EXCAVATOR--Leningrad Oblast--Machine builders at the Izhorskiy Zavod Production Association imeni A. A. Zhdanov have built two prototype strip mine excavators with 10 cubic meter buckets. The new earth moving machines can move up to 40 tons of rock mass in one cycle. Next year they will replace the 8 cubic meter excavators now produced by the enterprise. The new model is 25 percent more productive. Its metal intensiveness has been reduced 16 percent through the use of modern materials and technical innovations. It has a highly efficient long lasting planetary type transmission. The very comfortable operating conditions are an important feature. The cab has a comfortable seat equipped with vibration damping systems. It also has a washroom, refrigerator, hotplate for food and an electric drier. The machines have been shipped to miners at the Krasnogorskiy and Tomusinskiy Pits, Kemerovougol' Association, where they will undergo comprehensive testing. [By. V. Zhuravlev] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Feb 84 p 2] 11574

DEEP MINE--Karaganda--Miners in Kazakhstan have begun working deep coal deposits. The Stakhanovskaya Mine is the first in the basin to extract coal one kilometer deep. [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 6 Mar 84 p 1] 11574

NEW PIPELINE--Donetsk--The strings of railroad tank cars have disappeared from the petroleum loading points in the southern zone of the Donbass. For the first time today, fuel was moved here by a pipeline linking the Lisichansk refinery with the region's industrial centers. The new line will annually move more than one million tons of petroleum products. This has a double advantage: It will

reduce fuel losses during transport, which average 40 liters per tank car, and will also free more than 25,000 tank cars. The new 170 km steel artery will considerably improve the supply of petroleum products to the industrial region. The line, equipped with automatic distribution systems and pumping stations, will henceforth deliver fuel and lubricants directly to customers in Donetsk, Gorlovka, Kramatorsk and Krasnoarmeysk. The start-up of the line's second section, which goes through Zhdanov and Melitopol and continues to the Crimean Peninsula, will solve the fuel supply problems of industrial enterprises in the southeastern Ukraine. When it reaches planned capacity, the line will be able to annually move up to six million tons of petroleum products. [Text] [Moscow PRAVDA UKRAINY in Russian 31 Jan 84 p 2] 11574

KUZBASS OBLIGATIONS--Novokuznetsk--V. Silyutin's Komsomol-youth brigade at the Novokuznetskaya Mine, Yuzhkuzbassugol' Association, is surpassing the production schedule and producing 2,000 - 2,200 tons of coal daily. After producing 20,000 tons of above-plan coal in January and February the miners reexamined their annual socialist obligations and decided to ship 500,000 tons of coal, 30,000 more than intended at the start of the year. [By N. Poluyanov] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 23 Mar 84 p 1] 11574

NEW HYDRAULIC MONITORS--Novokuznetsk--The VNIIgidrougol [Scientific Research institute for Hydraulic Coal Machinery] has developed and the Yasnogorskiy Machine Building Plant has built a new hydraulic monitor. Until now, coal breakage at hydraulic mines used a stream of water at pressures of 120 atmospheres. However, as mining moves to lower horizons, stronger coal seams are encountered, reducing the efficiency of hydraulic working. The new monitor operates at a pressure of 160 atmospheres. Successful testing at the Krasnogorskaya Mine in the Gidrougol' Production Association has proved its high productivity. [By V. Bobrov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 28 Jan 84 p 2] 11574

VORKUTA DRYING WORK--Vorkuta--All drying units for preparing coal for loading at the Severnaya Mine in the Vorkutaugol' Association have been switched to associated gas. The use of methane at a single unit results in an annual savings of 15,000 tons of coking coal. The initiative of engineers and technologists at the Severnaya Mine is a good example for other collectives in the sector. [By V. Krukovskiy] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 5 Apr 84 p 2] 11574

NEW GUSHERS--Baku--It seems that it was only recently that there were oil gushers at the new Caspian Field imeni 28 April. Today [12 Mar 84] there was more joyous news. A well drilled by L. Musayev's brigade has started to produce at the 5,500 meter level. Output is more than 100 tons of condensate and 500 cubic meters of gas per day. [By L. Tairov] [Text] [Moscow PRAVDA in Russian 13 Mar 84 p 1] 11574

NOVOMOSKOVSK OVERFULFILLMENT--Miners at the Novomoskovskugol' Association have produced 100,000 tons of coal above the plan. Such a pace was obtained with fewer workers than last year. Scientific and technical achievements are being widely introduced at the enterprise, which is converting to progressive forms of work organization. One miners brigade now services two extraction complexes, considerably improving labor productivity. [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 13 Mar 84 p 1] 11574

WINTER WORK--Karaganda--This morning the Dolinskaya Mine had unusual guests: Ded Moroz and Snegurochka [Folklore: Grandfather Frost and the Snow Maiden]. They greeted the miners with the arrival of the New Year. The miners here were the first in the Karagandaugol' Association to report the fulfillment of this year's plans and obligations. They sent up 1,345,000 tons of coal, 150,000 more than the plan. Ded Moroz and Snegurochka also visited another mine in the basin, the Sokurskaya, the collective of which was ahead of time on the annual program, extracting 120,000 tons of coal in addition to the plan. [By. B. Glotov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 4 Dec 83 p 1] 11574

KUZBASS PROGRESS--Novokuznetsk--Miners at Yuzhkuzbassugol', the country's front running production association, have completed the annual coal extraction plan and the third year target. The high standard of work organization is the basis for the success. Average daily production per coal face is now more than 1,100 tons, the highest indicator in the Kuzbass. Collectives at the Zyryanovskaya, imeni V. I. Lenin and Kapital'naya Mines made the greatest contribution to above plan extraction. Competition is successfully spreading between brigades extracting 1,000 and more tons each daily. There are already 46 such brigades. Thirteen collectives have entered the ranks of 500,000 ton units, competing in a contract concluded on the pages of TRUD. An outstanding victory was attained by the famous brigade of Hero of Socialist Labor Mikhail Reshetnikov, which has brought up more than 1.5 million tons of coal since the beginning of the year. The collective of Hero of Socialist Labor Vladimir Devyatko has approached the million ton mark, while Petr Frolov's brigade has already passed it. The association's miners were initiators of competition to complete the five-year plan targets ahead of time and to extract 1.5 million tons of coal above the plan. They are keeping their word with honor. [By. Yu. Kotlyarov] [Moscow TRUD in Russian 1 Dec 83 p 1] 11574

KARAGANDA SUCCESSES--Karaganda--Yesterday the Karagandaugol' Association extracted the 10 millionth ton of coal since the start of the year. It has shipped more than 30,000 tons of above plan coal. The mine's technical reequipment assured the success of the sector's largest enterprise. The transition to the working of deep horizons caused additional difficulties: rock pressure and gas bearing seams. The comprehensive mechanization of coal extraction helped overcome them. Ninety percent of the coal is now extracted from working faces equipped with highly productive combines. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 16 Mar 84 p 1] 11574

BOGATYR' PIT RECORD--Ekibastuz--Yesterday the collective of the Bogatyr', the world's largest surface coal mine, achieved a great labor victory. For the first time, 50 million tons of coal was extracted within one year. Planned capacity was thus reached. The honor of loading the record ton in the tenacious competition was won by Viktor Sakharov's and Rudol'f Fetser's bucket wheel excavator progressive brigades. Both crews have now succeeded in mining and shipping the country's electric power plants 20 above plan railroad consists of cheap fuel each. "The pit collective's planned productivity was rapidly attained. This is above all due to improvements in production discipline, the proper rhythm in the arrival of empty cars and the conversion to bucket wheel equipment." said Rudol'f Fetser. "It is symbolic that a large RShRD-5000 excavator, the crown of domestic machine building, loaded this coal. Today the Bogatyr' produces 1 out

of every 4 tons of the country's coal extracted by surface methods. Day and night the tireless steel teeth dig into the dark seams at Ekibastuz in order to supply fuel to 26 electric power stations in Kazakhstan, the Urals and Siberia. More than 100 billion kWh of electrical energy is produced from this most inexpensive fuel. When the Ekibastuz GRESes go on line this figure will more than double. [By. V. Stupak] [Text] [Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 20 Dec 83 p 1] 11574

KARAGANDA MACHINERY--Karaganda--Many models of new coal mining machinery built at the Kargormash [Karaganda Mining Machinery] Production Association were first tested at the Karaganda Mine imeni Kostenko. Introducing ever more powerful complexes, miners have increased the average monthly output per worker to 109 tons. This is one of the best indicators in the sector. More than 10 years ago progressive brigades at the Mine imeni Kostenko initiated all-union competition to extract 1,000 tons of coal daily per longwall. At that time only a few miners reached such a figure. However, the Karaganda miners were able to take it by storm. They were given confidence by new equipment appearing at the mines. The KM-81 and KM-87 mechanized complexes increased the power of the extraction brigades. This gave birth to creative cooperation between the main machine building enterprise and the basin's progressive mine. Above all, it had an effect on miners' work. The "500,000 tonners" took a fancy to the new complex. With its help miners at the Mines imeni Kuzembayev and Maykuduskaya plan to extract 500,000 tons of coal at one longwall. Five extraction sections at the Mine imeni Kostenko have already been equipped with new units. They are not just struggling for 1,000 tons every 24 hours, but for 1,000 tons shifts. [By Yu. Razgulyayev] [Text] [Moscow PRAVDA in Russian 3 Mar 84 p 2] 11574

SVERDLOVSK RESULTS--Sverdlovsk (Voroshilovgrad Oblast)--Extract 50,000 tons of coal above the plan this year -- this is the main point in the socialist obligations by V. Koval'chik's extraction brigade at the Mine imeni 60 Years of the USSR, Sverdlovantratsit Association. The miners are proving their words with deeds. During January and February they produced 25,000 tons in addition to targets. Daily extraction has grown by more than 400 tons. [By. V. Mikhaylichenko [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 13 Mar 84 p 1] 11574

VORKUTA RESULTS--Vorkuta--Miners beyond the Arctic Circle have made a great contribution to fulfilling the country's Energy Program. Yesterday the Vorkutaugol' Association extracted the 500 millionth ton of high quality coking coal since the beginning of the field's development. The right to hoist up the jubilee ton was won competitively by the Oktyabr'skaya Mine brigade of I. Sorochinskiy, deputy to the USSR Supreme Soviet and Hero of Socialist Labor. [By TASS] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 6 Jan 83 p 1] 11574

PECHORA OBLIGATIONS--Extract 470,000 tons of coal above the plan -- such were the 1983 obligastions assumed by miners in the Pechora Coal Basin. They passed this mark ahead of time. Miners at the Vorkutaugol' Association produced 493,000 tons of additional fuel, while the collective at the Intaugol' Association produced another 305,000. Miners at the Vorgashorskaya Mine are leading the competition. [Excerpt] [Moscow SOVETSKAYA ROSSIYA in Russian 20 Dec 83 p 1] 11574

MINE OUTPUT--Donetsk--Once again miners collectives at the Krasnogvardeyskaya Mine near Makeyevka have reported annual plan fulfillment ahead of schedule. Since the beginning of the year 488,000 tons of coal have departed the enterprise's side tracks, bound for various customers. The successes are understandable. The mine collective was the first in the city to finish the third year of the five-year plan. Now the second has become the first in competition for ahead of schedule completion of the annual plan. Lutsk--Every day miners at the Novovolynskaya Mine No. 3, Ukrzapugol' Association are increasing their above--plan account. They were ahead of schedule in reporting fulfillment of targets for the five-year plan's third year. They have already hoisted more than 70,000 tons of above-plan coal and markedly reduced its production costs, saving 350,000 rubles. Socialist competition in the collective is lead by the first extraction section, which has produced an additional 6,000 tons of coal. The miners E. Maksimov, V. Stetsyuk and N. Dmitruk are, as always, in front. Voroshilovgrad --V. I. Lap's working face brigade at the Mine imeni Sverdlov is winning fame through high pressure work. Every day it extracts more than 1,000 tons of anthracite from the longwall. This year alone it has put more than 70,000 tons on above-plan account and fulfilled the third year targets ahead of time. Their successes are assisted by active help from other workers, primarily V. A. Mel'nikov's tunnel driving brigade. [Text] [Kiev RABOCHAYA GAZETA in Russian 23 Nov 83 p 1] 11574

NEW MACHINERY--Miners at the Adrasman Lead and Zinc Combine in northern Tajikstan have received new capabilities: a mining complex which is a match to the large mine has gone into operation. This mine has an inclined haulage shaft more than 2 km long, vertical and horizontal workings, ore chutes and a loading station. It is now possible for miners to introduce progressive, highly productive self-propelled equipment for ore extraction and transportation. The complete mastery of the complex will more than double the extraction of the ore from this field. [By. V. Legkodymov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Mar 84 p 2] 11574

DONETSK ACHIEVEMENTS-- The Krasnoarmeyskugol' Production Association was the first in the republic's sector to finish the quarterly program for coal extraction ahead of schedule. Since the start of the year it has supplied the country with more than 2 million tons of coking coal, of which 163,000 tons are above the plan. Miners at the largest coal enterprises -- the imeni A. G. Stakhanov and Krasnolimanskaya Mines, are setting the tone in socialist competition for above-plan increases in labor productivity and reductions in production costs. Seven mechanized brigades here daily produce more than 1,000 tons of coal each from comprehensively mechanized faces. USSR State Prize Winner V. I. Ignat'yev's famous miners detachment at the Krasnolimanskaya Mine has reached average longwall loadings of 2,000-2,500 tons of fuel. [By N. Ladanovskiy] [Text] [Kiev PRAVDA in Russian 27 Mar 84 p 1] 11574

WORK SPEED-UP--Ekibastuz--S. Zubko's brigade at the Bogatyr' Pit has sent, to the country's electric power stations, the 100,000th ton of above-plan coal extracted since the beginning of the year. Having reduced the time needed to fill a railroad car by 12 seconds, every day it is loading 1,500 tons of above-target fuel. The miners did this by increasing the speed of the main coal conveyor. By increasing labor productivity, this year the progressive collective has obligated itself to load 5.5 million tons of coal, exceeding the plan target by 250,000 tons. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 11 Mar 84 p 1] 11574

HEAVIEST COAL LOAD SHIPPED--Ekibastuz (Pavlodar Oblast)--The workers of the Virgin Lands Railway are greeting the approach of May Day with labor successes. Yesterday this country's first coal train carrying more than 30,000 t of coal departed from Ekibastuz Station. It will be delivered to electric power stations in the Urals. [Text] [Moscow TRUD in Russian 19 Apr 84 p 1] 11746

COAL MINED WITHOUT PEOPLE--Donetsk--Without going down to the face, V. Satuly's crew mined 3,000 t of coal at the Donetskugol' association's Mine imeni Gor'kiy. This marked the successful completion of an industrial experiment in mining coal in a particular thin seam (50 cm) without the participation of people. The method was proposed by workers at the Donetsk Scientific Research Institute of Coal. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 25 Apr 84 p 1] 11746

MODERN COAL-MINING EQUIPMENT--Tens of millions of tons of coal will be extracted this year from the Ekibastuzugol' association's pits. Powerful, modern equipment is helping to produce this amount of fuel. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 25 Apr 84 p 1] 11746

'COMMUNIST SATURDAY' IN DONBASS--Hundreds of thousands of people will participate in the Communist Saturday at the Donetchina mines, with more than 190,000 of them working underground, extracting coal and driving new workings. The plans are for 50 working faces to yield 1,000 or more tons each and 1,000 face workers from the central region of the Donbass [Donets Coal Basin] to at least double their normal output, with 20 of them having vowed to produce at least 500 percent of their shift quota. According to preliminary calculations, work in the heightened mode on the Communist Saturday will make it possible to bring up 280,000 t of coal, drive 3.5 km of basic preparatory workings, and do half a million rubles' worth of construction and installation work. The miners of the Krasnoarmeyskugol' and Donetskugol' associations have decided to take care of their 4-month coal extraction plan by the Communist Saturday. The miners at 40 mines and in 455 sections and crews, as well as 2,500 face workers, have set this same goal for themselves. By the anniversary of V. I. Lenin's birth, 80 sections and crews and 351 face workers will have completed their assignments for the first 4 years of the five-year plan. In order to further reduce production output costs, the miners of the Shakhterskantratsit association will use on the Communist Saturday electricity and materials that have been saved since the beginning of the year. [By correspondent V. Deshko] [Text] [Kiev RABOCHAYA GAZETA in Russian 13 Apr 84 p 6] 11746

CHINESE VISIT COAL AREAS--(TASS)--At the invitation of the GKES [State Committee of the USSR Council of Ministers on Foreign Economic Relations] and the USSR Ministry of the Coal Industry, we were visited by a Chinese delegation led by a councillor of the KNR [Chinese People's Republic] Ministry of the Coal Industry, Deputy Minister (Tszou Tun). The guests from China traveled throughout the Soviet Union and visited the Kansko-Achinsk, Ekibastuz and Western Siberian coal basins and the Novokramatorsk and Druzhkovka machine building plants. They also held conversations in scientific research and planning institutes. "We are satisfied with the results of the trip, during which there were interesting and useful meetings," the head of the delegation told Soviet journalists.

"The members of the delegation acquainted themselves with the USSR's experience in the field of the development and realization of coal extraction by the open-pit method, the organization of the work at a number of pits, and the equipment used in them. The purpose of our visit was to talk about technical assistance to the KNR for the construction of the Imin'khe pit in the northern part of our country." Tszou Tun expressed the opinion that there are prospects for developing cooperation between the two countries and that it is necessary to develop them. On 9 April, there was a meeting between USSR Minugleprom's [Ministry of the Coal Industry] and the members of the delegation in Moscow. At this meeting, proposals for cooperation between the USSR and the KNR were discussed. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 11 Apr 84 p 3] 11746

EQUIPMENT SHORTAGES RETARD PRODUCTION--Not even the recent replacement of the leadership (A. Kalfachiyan became general director of the Dzerzhinskugol' coal production association in place of A. Khomenko) helped improve the situation. In the first 2 months of this year, the miners got behind by about 120,000 t of fuel. Of seven mines, only the Novodzerzhinskaya and the Toretskaya are operating on a steady basis. Right now the association's enterprises are reaping the fruits of their negligent attitude toward preparatory work: almost all the mines do not have high-quality, prepared working faces. Under these conditions, specialists from the Ukrainian Minugleprom [Ministry of the Coal Industry] and scientists could have been of real assistance to the miners of Dzerzhinskugol'. However, there is no way the ministry can allocate three ANShch panel units, which would help increase output, for the Mine imeni Voroshilov. At the same time, DonUGI's [Donets Scientific Research Institute of Coal] specialists are only slowly developing the KGU unit, although great hopes have been placed on this timbering device. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 17 Mar 84 p 4] 11746

ECONOMICAL RECORD DRILLING RATES--Ali-Bayramly--The equipment and materials saved since the beginning of this five-year plan by Hero of Socialist Labor Akif Amanov's drilling crew, which is part of the Ali-Bayramly Drilling Operations Administration, is sufficient operational boreholes. Thriftily and economically the collective makes use of pipe, reagents, drilling tools and electricity. Skill in counting every State kopeck helps the drillers helps the drillers work at record rates. They have already drilled through 30,000 m of rock and turned over 14 wells to the operators; they have fulfilled their five-year assignment. [By correspondent D. Melikov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 30 Mar 84 p 1] 11746

ABOVE-PLAN OUTPUT AT GUKOVO--Gukovo (Rostov Oblast)--The collective of the Gukovugol' [expansion unknown] association's leading Mine imeni 50-letiya Oktyabrya has exceeded the planned labor productivity level by 10 percent since the beginning of the year. In 2.5 months the miners have sent to the surface more than 40,000 t of above-plan anthracite. On the day of the All-Union Leninist Communist Saturday, 1,400 miners will descend to the working faces. They will conduct all their production operations with materials and electricity that have been saved. [By correspondent V. Uzhakin] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 21 Mar 84 p 1] 11746

ABOVE-PLAN OUTPUT BY DONBASSANTRATSIT--Krasnyy Luch (Voroshilovgrad Oblast)--Every evening, a red star lights up over the headframe at the Mine imeni Gazeta

IZVESTIYA: that enterprise's miners are working in the shock mode this year. In the extraction crews, labor productivity exceeds the planned figure by 13 percent, and the value of each percentage point is high: 3,000 t of coal. A few days ago, a train carrying 40,000 t of above-plan anthracite was sent to the consumers. The collective is also carrying out successfully an additional Party assignment to reduce production costs. Right now, each ton of coal that is extracted costs 1.59 rubles less than the planned figure. [By V. Mikhaylichenko] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 17 Apr 84 p 1] 11746

DONBASS MINERS OVERFULFILL PLAN--Donetsk--The miners in the Donbass [Donets Coal Basin] followed attentively the work of the April (1984) Plenum of the CC CPSU and the first meeting of the 11th convocation of the USSR Supreme Soviet. They unanimously approve and support the internal and external policies of our Party and the Soviet government, which are aimed at preserving peace and improving the prosperity of the Soviet people. The realization of the planned program depends entirely on how we work and the accuracy and harmoniousness of our work. I wish to say a few words about our enterprise's work. On the day the CC CPSU Plenum opened, this mine's workers reported the fulfillment of the 4-year coal extraction plan. Since the beginning of the 11th Five-Year Plan, consumers have been sent more than 500,000 t of high-quality, above-plan coal. There are no lagging sections at this mine. The labor productivity quota for the first quarter was overfulfilled by 10 percent and the cost of extracted fuel was reduced by 0.6 percent. Mutual assistance is a good tradtion among us at the mine. Right now, our crew has moved, to a man, to an adjacent face where our experience and knowledge is needed. The work, as they say, goes swimmingly. We are not only overfulfilling the plan, but are also introducing new mining technology, which will make it possible to improve all our technical and economic indicators. Our miners perceived as a Party order the conclusions and propositions contained in the speech that Comrade K.U. Chernenko, general secretary of the CC CPSU and chairman of the presidium of the Supreme Soviet, gave at the April Plenum of the CC CPSU. We have decided to reinforce the successes we have achieved and complete the 5-year coal extraction plan by 1 March of next year. [By N. Baybarin, working face crew leader, Mine imeni Gor'kiy, Donetskugol' coal production association] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 17 Apr 84 p 1] 11746

URENGOY--TSENTR-1 PIPELINE SECTION COMPLETED--Cheboksary--The 127-km section of the Urengoy--Tsentr-1 gas pipeline that passes through the territory of Chuvashia from the Volga to Sura has had its line work completed. The flow-line method of working helped the builders of the Kuybyshevtruboprovodstroy [Administration of Pipelines under Construction in Kuybyshev] trust determine its intensive schedule: all of the collectives are working for the final result. This made it possible to maneuver people and materiel more efficiently. Despite the spring thaw and slushy season, the work has not fallen behind schedule by even a single day. Right now the builders have set out to lay the Urengoy--Tsentr-2 pipeline. [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 8 Apr 84 p 2] 11746

NEW TIMBERING UNIT--The miners at the Krasnoarmeyskugol' association's Mine imeni Stakhanov extract more than 8,500 t of coal per day. This productivity level is the result of the use and mastery of face complexes with specifications that make it possible to exceed the 1,000-t production barrier by a

factor of two or three. However, they frequently do not function well under the geological conditions that are encountered, particularly when the seam roofs are extremely unstable and difficult to bring down. But now something new has arrived: the IKMT complex, which was developed by Giprouglemash [State Planning, Design and Experimental Institute of Coal Machinery Manufacturing] and manufactured at the Druzkovka machine-building plant. It demonstrated its good operating qualities at the Mine imeni Stakhanov. With its help, the working face production load averaged almost 1,200 t of coal per day, which made labor productivity per worker per month more than 453 t. [Text] [Kiev RABOCHAYA GAZETA in Russian 13 Apr 84 p 5] 11746

BORODINSKIY PIT PRODUCTION UP--Krasnoyarsk Kray--The flow of coal from the Borodinskiy pit, which is an important part of the Kansko-Achinskiy fuel and power complex, is getting bigger. Since the beginning of the year, more than 8 million t of fuel has been extracted, which is 1.6 percent above the planned quota and almost 5 percent more than was extracted during the same period last year. [By correspondent V. Khrustalev] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 13 May 84 p 1] 11746

MECHANIZED COAL-MINING COMPLEX--Karaganda--A mechanized complex has been put into operation at the Mine imeni Kostenko, which is the largest mine in the Karaganda basin. It will be used to work coal seams that are up to 4 m thick. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 6 Apr 84 p 1] 11746

OUTSTRIPPING COAL PRODUCTION NOTED--Gorlovka--"There are two five-year plans!" That was the brief report given on the labor triumph of F. Kushch, a cutter at the Artemugol' association's Mine imeni Izotov. Since the beginning of the five-year plan he has chopped out about 20,000 t of high-quality fuel, which is about 13,000 t above the norm. This master of the pick-hammer does enough work for three men. For instance, his average fulfillment of the production norms is 291.7 percent since the beginning of the five-year plan and 343 percent so far in 1984. [By correspondent F. Dorofeyev] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 22 Apr 84 p 1] 11746

ABOVE-PLAN COAL PRODUCTION NOTED--In the controller's journal of the Krasnodonugol' production association's Orekhovskaya mine, a figure has been entered: 30,000. This is how many tons of above-quota coal the enterprise's miners have sent to the surface since the beginning of the year. The decisive factor in the success they have achieved is an increase in labor productivity. Right now it is 15.8 percent above the planned level. [By V. Mikhaylichenko] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 25 Apr 84 p 1] 11746

SOLID-FUEL GASIFICATION UNIT--Leningrad--At the Central Institute of Boiler Turbines imeni I.I. Polzunov scientific research association, developers have finished planning and issued the last working drawings for the production of this country's first steam-and-gas installation for the gasification of solid fuel. It has a rated capacity of 250,000 kW. The first industrial models of this new installation will be manufactured next year. [By V. Alyushinskiy] [Text] [Moscow IZVESTIYA in Russian 31 Mar 84 p 1] 11746

PIPELINE CONSTRUCTION

PROBLEMS IN PROTECTING PIPELINE DESCRIBED

Baku VYSHKA in Russian 7 Mar 84 p 3

[Article by K. Dai-Zade, director of Anti-corrosion Protection Laboratory, TsNIPR [Central Scientific Research Institute], Oil and Gas Extraction Administration imeni 26 Bakinskiye Komissary: "Protecting Metal from Corrosion"]

[Text] At the plenum of the Azerbaijan Communist Party Central Committee, devoted to the tasks of the republic's party organization for fulfilling the decree of the CPSU central committee and USSR council of ministers "Measures for Accelerating Scientific-Technical Progress in the National Economy", the need was underlined to press for an increase in the efficiency of public production, basic growth in labor productivity, and reductions in expenditures of all types of resources, based on the broad introduction into practice of the achievements of science, technology, and previous experience.

The efforts of our Central Scientific Research Institute's Anti-corrosion Protection Laboratory, under the Oil and Gas Extraction Administration imeni 26 Bakinskiye Komissary, were directed toward the solution to this problem. The fact is, the deposits being developed by a collective of our NGDU [Oil and Gas Extraction Administration] are characterized by the high content of mineralized water, saturated with hydrogen sulfide and carbon dioxide. For this reason, in nearly forty percent of the entire operating stock of wells and oil field equipment breaks down prematurely due to intensive corrosion--primarily in tubing strings and deep-pump rods. This leads to an increase in the number of underground repairs.

Matters are not much better with field pipelines. Well oil collection traps and delivery lines have leaks, due to the effects of corrosive agents, and must be replaced after less than half a year. The annual replacement is up to tens of kilometers of pipe, weighing 3,000 tons in all.

Therefore, effective measures in the struggle against corrosion take on special importance for our industrial economy. They are directed toward the use of both corrosion inhibitors and metal-plastic, polyethylene pipes.

It must be said, that in the five years that have passed since creation of our laboratory, concrete results have been achieved: the number of wells that were treated with corrosion inhibitors grew from 28 in 1978, to 132 in 1982. This made it possible to avoid 783 underground repairs, and to save over 53,000 meters of tubing and more than 500 deep-pumping rods. Last year, working in constructive collaboration with scientists of the Inorganic and Physical Chemistry Institute, Azerbaijan SSR Academy of Sciences, we successfully used a corrosion inhibitor in 21 hydrogen sulfide wells, obtained from production waste of the Kirovabad Meat and Fat Combine. Nearly 300 treatments on the well permitted to extend the service life of pipes and rods and to save 30,000 rubles by reducing the number of repairs. In addition, the experience we gained here permitted us to introduce this relatively cheap inhibitor in other OGEAs.

As concerns extending the service life of field delivery lines, steel pipes lined with polyethelene, having an overall run of 2,700 meters and first used in 1979 as oil traps, have yielded the greatest effect. Their service life in comparison with standard pipes grew 15-fold, which permitted over the period of five years to save the equivalent of tens of thousands of rubles annually. In 1981 these pipes were also successfully used in the "Leninneft'" and "Ordzhonikidzeneft'" NGDU's.

Broad possibilities and polyethelene pipes, with which we began experimenting last year in accordance with a contract with the All-Union Main Pipeline Scientific-Research Institute, are opening up ahead of oilmen. Specialists from this institute-with our help-completed work on butt-resistance welding and pressure testing of two polyethylene oil traps, with an overall run of 650 meters, in the third and fourth fields. Scientists from Moscow helped teach our welders from the NGDU construction-assembly to operate the welding equipment built by TsBPO [central base for production maintenance] of the Azneft' Association according to their designs) to our welders. Currently, preparations are underway for laying polyethylene pipes with an overall run of 450 meters, as delivery lines from wells No. 872 and No. 1313.

In the fourth year of the five-year plan, in collaboration with scientists in other areas of the country, we have much to do to reduce metal consumption for field delivery pipelines. At the basis of our contract on constructive collaboration between our NGDU and TatnIPIneft' [Tatar Oil Industry Scientific Research and Design Institute] is use of metal-plastic pipes for pumping-in industrial water to injection wells, where pressure reaches 100-150 atmospheres. We are now awaiting receipt of the experimental run of such pipes from the Pervoural'skiy plant.

In addition, we are faced with testing a novelty proposed by scientists of UkrGIPRONIPInefti [Ukranian State Oil Industry Scientific Research and Design Institute]--joining metal-plastic pipes by the same welding method used on polyethylene pipes.

In short, the horizons are encouraging, and everything would have gone well if it were not for one unfortunate circumstance. I already mentioned the successes we achieved in using corrosion inhibitors introduced into wells that give off a large quantity of hydrogen sulfide. But in the so-called nonhydrogen sulfide wells, where corrosion formation still occurs to a great degree, these operations had to be curtailed. In 1982 such processing was done in 132 wells, but in 1983--in only 50.

The reason lies in the fact that the Nevinnomyssk Chemical Combine, manufacturer of the corrosion inhibitor for non-hydrogen sulfide wells that was developed by AzNIPIneft', ceased its delivery to us. But this is understandable: in conjunction with the development of oil and gas production in the northern and eastern regions of the country, the demand for this inhibitor grew.

However, there was a way out. As far back as 1967, a corrosion inhibitor was developed by specialists of the Organic and Physical Chemistry Institute, Azerbaijan SSR Academy of Sciences, which was successfully used in wells of "Ordzhonikidzeneft' NGDU. The cost of this inhibitor is half that of an imported one, the technology for obtaining it is sufficiently simple--it is based on production waste from the Baku Oil Refinery imeni A.G. Karayev, which presently is sent to the dump.

More than a year has passed since the chief engineer of the Azneft Association held a conference, at which it was decided to organize the production of this inhibitor in amounts of from 600 to 1,000 tons a year, with the aim of increasing the production of oil beds. However, as the saying goes, it's putting the cart before the horse. It is true, the installation is almost ready, equipped with the necessary equipment. To complete it would be a small matter, because only the welding on a number of units remains to be done. This task, entrusted to the construction-assembly section of the Ordzhonikidze NGDU, was not completed as was explained to us because of the lack of compressed oxygen.

Over the course of the last year, our NGDU repeatedly turned to the Azneft' Association with requests to accelerate the output of inhibitor, but for the time being, this problem has still not been solved.

There is no need prove that the struggle with metal corrosion is an important national economic problem. This is confirmed by the examples cited above. With proper organization it is possible to obtain ponderable results today. The Azneft' Association, and other interested organizations, must help us in this.

12304
CSO: 1822/322

IMPROVEMENT OF PIPELINE CONSTRUCTION TECHNOLOGY URGED

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 4, Apr 84 pp 2-4

[Unattributed article: "To Accelerate the Introduction of Scientific and Technical Achievements Into Production"]

[Text] The achievements in the building of oil and gas industry enterprises are based upon a further industrialization and mechanization of the work, the broad automating of the production operations, improving the organization and management of the construction process and improving the quality and reliability of the projects being built. These areas in the development of the sector are envisaged in the comprehensive program worked out in accord with the decisions of the 26th CPSU Congress, the November (1982) and June (1983) Plenums of the CPSU Central Committee and the Decree of the CPSU Central Committee "On the Work of the Ministry of Construction for Oil and Gas Industry Enterprises in the Technical Reequipping and Introduction of Progressive Construction Methods."

In using an integrated systems approach to solving the problems, the specific program method, the ministry is carrying out scientific research, design and experimental construction work under two such important scientific and technical programs approved by the GKNT [State Committee for Science and Technology], the USSR Gosplan and the USSR Academy of Sciences as "The Development and Introduction of a Set of Machines, Production Methods and the Organization of High-Speed Flow Construction of Pipelines 1,420 mm in Diameter and a Pressure of 7.5-12 Megapascals and Complete Modular Compressor Stations for Moving the Gas From Western Siberia to the European Center of the Nation" and "The Development of the Western Siberian Oil and Gas Complex and the Formation on Its Basis of the Territorial-Production Complex of the Western Siberian Plain for the Period Up to 1990 and the Long Run Up to the Year 2000." Assignments and work stages are also being carried out under 20 national scientific and technical programs (out of the 170) and under 20 sectorial scientific and production programs.

During the previous period of the five-year plan, a good deal has been done to work out and develop the production processes and equipment for building projects of the oil and gas industry.

For solving complex scientific and technical problems involved with the laying of large gas lines in unified corridors, building on permafrost ground and swampy terrain, in employing multilayered pipe and pipe of other designs, preparing to transport highly viscous oils and cooled gas and protecting the

pipelines against corrosion, fundamental academic science has widely been drawn upon. The organizations of the USSR Academy of Sciences and the Union Republic Academies of Sciences have provided great aid to the ministry.

The ministry has also involved more than 50 institutes of the institutions of higher learning as well as other ministries and departments in the scientific and design work. Sectorial science has major experimental facilities. Exceptionally good conditions for the rapid introduction of the scientific and design developments have come into being as a result of the establishing and development of a machine building subsector in the ministry.

Just in 1975-1983, some 228 designs were worked for machinery and mechanisms, 173 prototypes were manufactured and 98 different types of equipment were put into series production. Over this period an economic effect of 215 million rubles was obtained from introducing the developed machines and mechanisms.

The successful realization of the large-scale programs outlined for the 11th Five-Year Plan and the following years to build oil and gas industry projects is possible chiefly due to the further acceleration of scientific and technical progress. The diverse measures worked out and implemented in the Minneftegazstroy [Ministry of Construction of Oil and Gas Industry Enterprises] to carry out the Decree of the CPSU Central Committee and the USSR Council of Ministers "On Measures to Accelerate Scientific and Technical Progress in the National Economy" are aimed at reducing the time for putting the recent scientific and technical accomplishments and advanced experience into practice.

These measures envisage first of all a further rise in the effective work of the scientific research and design organizations. The scientists and specialists should focus their efforts on carrying out urgent tasks related to the sector's development, developing fundamentally new types of equipment and production methods as well as actively aid in widely introducing the developments into construction work and fully utilizing the existing reserves and the accomplishments of the CEMA member nations in the scientific and technical area.

There are plans to further involve the scientific potential of the institutes of the USSR and Union Republic Academies of Sciences and institutions of higher learning in the problems of oil and gas construction and broaden the programs of their joint work for 1984-1985. For increasing the effectiveness of collaboration with fundamental science, the sector envisages each year to incorporate in the plan for introducing new technology quotas for utilizing the results of joint research with the institutes of the USSR and Ukrainian Academies of Sciences and the VUZes and achieve the unconditional fulfillment of these quotas.

In order to improve the organization and results of the research being carried out by the institutes and design bureaus, an inventorying has started on the scientific research, experimental design and experimental work carried out in 1981-1983. In 1984, a general catalog should be compiled of developments recommended by the institutes and design bureaus for introduction with the indicating of their technical and economic indicators. There are also plans for the further development of the experimental facilities of the institutes and design bureaus. In 1984-1985, they plan to make an experimental check on the

basic provisions of converting the scientific research institutes and design bureaus to the new system for organizing work in the area of creating, developing and introducing equipment on the basis of schedule orders (a system of payments for the fully completed and client-accepted work) at the VNIIST [All-Union Scientific Research Insitute for Pipeline Construction] and the NIPIorgneftegazstroy [?Scientific Research and Design Institute for the Organization of Oil and Gas Construction].

For increasing the effectiveness of the sector, the plan quotas for the manufacturing and introduction of new equipment as of 1984 are to be incorporated in the production operational plans of the enterprises and organizations on equal status with the quotas of the state plan while constant control over the course of their implementation is to be established. A sectorial system should be worked out for evaluating the influence of fulfilling the plans and quotas related to scientific and technical development on the production activities of the construction subdivisions.

An extensive group of measures has been planned for accelerating scientific and technical progress in building the large-diameter and field pipelines. Great attention is to be given to further increasing the technical level of welding operations on the basis of widely employing automatic welding methods, advanced technology and improving the quality control system for the welded joints.

In 1984, a range of projects should be completed for testing the multilayered pipe for gas lines operating at a pressure of 7.5 megapascals. There are plans to build and put into operation in 1985 a 350-km test section of a 1,420-mm gas line made from multilayer pipe and designed for an operating pressure of 10 megapascals. There are plans to develop new special machines for building pipelines with a 1,420-mm diameter and a pressure of 10 megapascals.

The use of robot equipment will also be expanded. Over the 2 years they plan to develop and introduce 45 units of robot equipment, including 6 in line construction and 11 and 28 units, respectively, at the machine building and building industry enterprises. There are plans to conduct a survey of the production processes in construction and at the industrial enterprises in order to determine the possibility of employing more progressive ideas in them with the use of microprocessor equipment, robots and automated production. On the basis of the results of such a survey, a specific program should be worked out for automating the production processes. The demands of widely employing microprocessor equipment must be considered in designing and reconstructing the enterprises as well as in developing new machines and mechanisms.

In order to increase the pace and the quality of work on permafrost ground, there are plans to complete the testing of the I524 experimental full-profile excavator, organize the production of the MBSh321 machines for drilling blast holes in permafrost ground and test a drilling head for a diameter of 300 mm.

An important area for scientific and technical progress in building pipelines is to ensure year-round construction on swampy territory.

This year we must work out and test out in the regions of the Middle Ob a new technology and system for fully mechanizing the construction of field pipelines

during the summer on swampy and flooded terrain. The development of special cross-country equipment will be continued.

The VNIIST, the NIPIorgneftegazstroy, the main associations and administrations have been instructed to develop for year-round construction on swamps and in 1985 introduce the structure of an integrated flow for building the line part of main pipelines. The design decisions must be improved for laying pipelines under the conditions of swamps and flooded terrain in the summer season. We must work out and develop equipment for the hydrolic testing of pipelines up to 1,420 mm in diameter during the winter period.

We must develop an all-season installation, earth moving and pipe laying facility for year-round flow construction of main pipelines.

Considering the use of the new equipment and production methods, flow charts should be worked out for the basic types of jobs in laying the main and field pipelines on swamps.

It is essential to conclude the research and develop new designs and production methods for building temporary industrial-type field roads with a prefab road surface and employing synthetic unwoven materials for building the pipelines on swampy and flooded terrain. It is also essential to develop and master the technology and organization of year-round construction on swampy territories for cable lines and the permanent structures for pipeline field communications. A range of measures has been planned for effectively anchoring and weighing down the pipelines built in swampy areas and on flooded terrain. Here we should study the possibility of employing polymer container ballast devices.

The insulating level of the pipelines using polymer adhesive tape, wrapping and polymer primers should be brought up to 50 percent of the total pipe volume. We must develop the insulating of large-diameter pipe using a combined method (spraying on of polyethylene and the subsequent application of heat and light stabilized tape). In 1984-1985, we must produce special equipment for handling insulated pipe with a diameter of 1,420 mm.

There is to be further development of the machine building subsector for producing small series of pipeline equipment. The volume of machine building and metalworking products in 1985 should increase up to 200-220 million rubles. We will produce the most important types of machinery and equipment for pipeline construction. For manufacturing special machines of predominantly higher quality in 1984-1985 we intend to introduce a number of sectorial standards which control the equipment quality level.

In order to stimulate improved quality in the equipment being developed, the VNIIST together with Glavneftegazstroymekhanizatsiya [Main Administration for the Mechanization of the Oil and Gas Industry] have been instructed to work out instructions to determine the effectiveness from the development and modernization of machines and showing the change in their reliability, human engineering, economy and other quality properties as well as prepare a regulation on the economic relations between the client, the developer, the manufacturer and the consumer of the special machines for pipeline construction.

Measures have been planned to broaden enterprise capacity, to reconstruct them, modernize the equipment and utilize progressive methods for manufacturing and repairing the machines. Starting in 1985 it has been decided to introduce at all the repair enterprises of Soyuzremonttruboprovodtekhnika [All-Union Administration for the Repair of Pipeline Equipment] an integrated system for repair quality control. Subsequently at the plants of the same association they intend to utilize a system of repair control of the SORM type. In following years a sector-wide system will be introduced for supplying spare parts for machinery and mechanisms employing a computer for automated accounting and control. Also to be introduced is an automated system for accounting for the consumption of fuel, thermal and electric energy.

Industrial methods will be further widely employed in ground-level construction in erecting both industrial and nonproduction projects.

The annual construction volume from large-sized elements, assemblies, panels and blocks with complete prefabrication of the bearing and partition elements in 1985 will reach 3.1 billion rubles. By the end of the five-year plan, labor productivity in above-ground construction should increase by 14 percent in comparison with 1980. The reaching of the designated indicators is possible by carrying out, for example, such measures as: introducing a unified, standardized system for modular-complete devices making it possible to significantly raise the level of mechanization and automation in their manufacturing and installation and ensure a 10 percent rise in labor productivity (in 1985); scientifically establishing the demands for intensifying the production processes and miniaturizing the equipment for complete-module construction; the development of new construction methods using large-sized modules weighing up to 1,000 tons for equipping the Yamburg Deposit; reducing the metal intensiveness of the modular devices by 5-10 percent by employing light concrete bases and accessories which reduce the transport and installation loads; increasing the degree of the effective use of the construction volume of the modular units and shelter buildings (optimum layout and arrangement ideas, rational dimensions of the modules and buildings); shortening the time for manufacturing the modular units, improving their quality and so forth. In the long run there should be a system for making up the modular units directly from the supplier plants. The proportional amount of field units assembled from completely plant manufactured container modules should be increased to 95 percent.

A significant effect will come from improving both the management structure for complete-module construction and the economic mechanism in it. In 1984-1985 there are plans to introduce an automated system for designing the flow-organization for building above-ground projects.

For the complete development of the towns and settlements in the sector they plan to annually increase the amount of housing, social and cultural-service construction. Production capacity is to be increased at the enterprises for large-panel and large-module housing construction and improve their utilization. Technical reequipping and reconstruction will be completed on the existing plants and shops for large-panel housing construction and they will reach their design indicators. New types of materials and articles are to be used and the methods and organization of construction are to be improved. The carrying out of the listed and a nubmer of other measures will make it possible by 1985

to bring the prefabrication level in building nonproduction-end projects up to 85 percent.

There is to be a significant increase in the output of progressive structural elements, connecting pieces and assemblies of the pipelines, spiral-seam pipe with an inner lining, effective building materials and new insulating tape. Here they intend to widely employ resource-saving production methods.

Scientific and technical progress in oil and gas construction envisages a significant rise in the quality and realiability of the projects being built. In 1985, a comprehensive system for quality control should be introduced in laying the main pipelines as well as at the enterprises of the building industry and machine building. By 1985, there should be a 100-percent coverage of the work done on the routes of the main pipelines by an operational control system. There are plans to organize cost accounting sections and administrations for supervising the quality of construction in the pipeline-building main administrations and trusts. Research is to be completed on the following: the relationship of the quality parameters of the pipelines and the indicators of their reliability, the conditions for improving the operating reliability and durability of the pipelines using an assessment of their stress-deformed state by the acoustical emission method; the influence of the flaws in the welded joints on the work capacity of the pipelines.

For improving quality of construction, the further development and improvement of sectorial standardization is of important significance. Here the basic task has been set of ensuring the prompt and high quality preparation of the technical normative documents, using scientific and technical achievements and advanced experience in working this out. Great importance is being given to working out the organizational-procedural and normative documents establishing the basic provisions for a sectorial system of quality control for the product and the construction-installation work in addition to a program for complete standardization of the complete modular units for building above-ground projects.

One of the areas for realizing the scientific and technical achievements is the extensive use of effective inventions and innovation proposals. Measures have been outlined to increase the level and results of patent, licensing and invention activities in the sector. The most effective inventions and innovation proposals will be used primarily in the sectorial, comprehensive program for reducing the use of manual labor. On the basis of the proposals to improve control over the process of reducing manual labor, a regulation will be established on the setting up of administrations and sections for simple mechanization.

The growth and development of the sector's productive forces necessitate the corresponding development of production and economic relations. A number of broad economic experiments being conducted in the ministry is aimed at improving these relations. There must be the unconditional fulfillment of the system of economic organization measures envisaged by the comprehensive program for improving the economic mechanism. The experiment will be continued of introducing new management methods and high-speed flow construction of the main pipelines.

There is to be further development of automated control systems in the sector. In 1985, a specific comprehensive scientific-production program must be worked out for developing an integrated system for the automated designing of production methods, the organization and control of pipeline construction. In the following year there are plans to put into use an automated system for monitoring the fulfillment of the plans for introducing new equipment, advanced production methods and measures to raise labor productivity. A long-range program is to be drawn up for joint research with the USSR Academy of Sciences, the Ukrainian Academy of Sciences and the National Economic Academy under the USSR Council of Ministers on the problem of preparing a model of the construction-installation organization of the future.

During the 11th Five-Year Plan and in subsequent years, there will be further development for such an important area of scientific and technical progress as the development of main pipeline systems for the hydraulic transporting of coal, ore concentrates and the raw materials for mineral fertilizers. The construction of these systems and the delivery of complete projects are to be carried out under "turnkey" conditions. There are plans to carry out scientific research and experimental design work in the area of developing new types of transport and in 1984-1985 to introduce into the national economy at least 15 transport systems for carrying inert and ore materials.

The carrying out of measures based on the comprehensive scientific-production programs for the rapid introduction of achievements of scientific and technical progress into practice will make it possible to substantially increase labor productivity in the sector and, consequently, to raise the effectiveness of oil and gas construction to a higher level and make a new major contribution to the further development of the nation's fuel and energy complex.

10272
CSO: 1822/290

PROGRESS, PROBLEM AREAS IN PIPELINE CONSTRUCTION TRACED

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 4, Apr 84 pp 6-9

[Article by A. M. Zinevich of the VNIIST: "Scientific and Technical Progress in Building Pipeline Transport Systems"]

[Text] The Decree of the CPSU Central Committee and the USSR Council of Ministers "On Measures to Accelerate Scientific and Technical Progress in the National Economy" has raised as a major task a fundamental improvement in all work in accelerating scientific and technical progress and has pointed out the ways to carry this out. One of the areas to carry out the set task is to increase the results of the work done by the scientific research and design organizations.

The measures to accelerate scientific and technical progress should encompass various problems in the development of the fuel and energy base and this to a significant degree is related to implementing the outlined program for building pipeline transport systems for oil, gas, oil products, coal and so forth. The successful implementation of this program is possible under the condition of considering the particular features of scientific and technical progress in the present stage and the near future as well as the specific development of pipeline transport itself.

Among the most important particular features of scientific and technical progress and its core--the scientific and technical revolution--one must put first of all the rise and development of the tricomponent system of "science--technology--production." A falling behind of any of its components leads to a falling behind of the entire system and to a slowdown in the pace of scientific and technical progress. Science in a fuller scale is being turned into a direct productive force. This is possible if its results are widely employed in production.

The production methods have moved to the forefront as the leading force of technical progress (although at present in many processes equipment plays the basic role) with the simultaneous automation and cybernetization of the processes. Scientific and technical progress requires a maximum conformity of the level of the organization of production and labor to the development level of the production methods and equipment. The role of ensuring quality and reliability grows exceptionally.

The development of pipeline transport can be characterized by the following particular features: the length and capacity of the systems being built are constantly increasing, the design ideas are becoming more complex, new materials and structural elements are being employed and there is a growing importance of multiple functions (transport mainlines, capacity for oil and gas, high-pressure boilers and welded bearing elements) carried out in different soil and climatic zones of the nation. The nation's economy to an even greater degree depends upon the continuous operation of pipeline transport. For this reason the demands are being increased upon the quality and reliability of the structures and their forecasting; here the tasks have been set of shortening the construction times, unifying the individual operations into a single flow production cycle, their synchronization and full mechanization.

In working out the strategy and tactics for accelerating scientific and technical progress in pipeline construction, the collective of the VNIIST [All-Union Scientific Research Institute for Pipeline Construction] has taken into account the particular features of the development of both pipeline transport as well as scientific and technical progress as a whole at the present stage.

The VNIIST brings together significant scientific potential in the sector (80 percent of the doctors of science and more than 65 percent of the candidates of sciences) making it possible to perform the role of the head scientific research institute in the area of building main pipelines. Over the last 3 years by introducing the institute's developments, we have been able to reduce the cost of construction-installation work by 186 million rubles and estimated costs by 2 percent while achieving a 17 percent rise in labor productivity from what has been achieved as a whole in the sector, while in line construction this share has exceeded 50 percent. Of the patents received by the sector, 91 percent are the institute's inventions, of the licenses sold by the sector 82 percent are the institute's licenses and of the income-producing contracts with foreign countries in the area of scientific and technical ideas of the engineering type, 87 percent have been concluded from the results of the institute's scientific research and this shows its high level.

The VNIIST is working on 17 major scientific and technical programs of the GKNT [State Committee for Science and Technology], the USSR Academy of Sciences and the USSR Gosplan, 8 specific comprehensive programs of the USSR Gosstroy as well as 10 specific sectorial scientific and production programs. At the same time, the institute is carrying out directive assignments. Work is being conducted jointly with 22 institutes of the USSR and Ukrainian Academies of Sciences, 20 VUZes, 10 institutes of the USSR Gosstroy and more than 80 sectorial, scientific, design and production organizations.

At the same time, the scientific and technical potential of the VNIIST is still not fully used and a certain portion of the developments is not widely employed. The effectiveness of the activities of a number of the scientific research sections and laboratories is below the achieved average level. In certain laboratories there is a predominance of research which satisfies the current needs of the sector but is not sufficiently long-range. The experimental facilities of the institute need modernization and reequipping.

The basic way for increasing the institute's contribution to further accelerating scientific and technical progress in the construction of main pipelines is primarily activating the creative abilities of each scientist, engineer, technician and the entire collective.

The efforts of the institute's collective are focused on solving major problems in the following basic areas of the sector's scientific and technical progress.

The methods, organization and management of construction. Mechanized production methods have been worked out for building the pipelines and these make it possible on an assembly-line basis to produce a finished product, that is, a complete pipeline (a section of it), that is, to perform all the production operations comprehensively and in proper sequence (preparatory, transport, earth moving, welding, insulating-laying, pressure-testing and so forth) with a set productivity (pace) and this is supplied with the required optimum resources for the flow considering the design features of the pipeline and the conditions of the route. The advantages of such a production method have been most fully realized in building the Urengoy--Pomary--Uzhgorod gas line, as for its level there was the corresponding required level for the organization and management of construction, starting from the ministry, the main administration and trust and ending with the production flow line.

The methodology created for organizing and managing rapid flow-line construction envisages the working out of a sectorial plan for the organization of work (POR) with the planned building of the projects of the sector's five-year plan and the necessary resource support considering the creation of standby resources. On this level an overall coordination of work is being provided for all the production subunits engaged in the building of pipelines. On the level of the main administrations the organizational and management questions are being worked out and solved within the limits envisaged by the sectorial POR while on the levels of the trusts and construction administrations, the questions are being settled of ensuring the uninterrupted functioning of the immediate production flow lines.

The transition to an integrated structure of the trusts, like the specializing of the construction administrations by stages of the production process (instead of production specialization), has also helped to better realize the capabilities of the production methods. For this purpose in a majority of the trusts they have set up subdivisions for the engineer preparation of construction, for road-transport work, as well as for the complete execution of the basic jobs, that is, the leading flow line within which are specialized brigades for performing individual types of work. In terms of saturation with equipment, labor forces and in terms of productivity, the flow lines are differentiated into large, medium and small.

Planning the activities of the flow lines should be based and at many projects is based on the calendar schedules for continuous work over the five-year plan. Such a schedule makes it possible to perform the preparatory operations ahead of time. The leading flow-lines have reached a productivity in building large lines of 200 km a year with an average of 80-100 km.

However, the achievements are still not being fully realized in the area of the scientific organization and management of pipeline construction.

An analysis of the work done by the flow lines over the last 5 years indicates that they spend 40 percent of the time in their basic jobs, 37 percent in setting up and taking down the work and 23 percent of the time is spent on moving between projects. Consequently, one of the reserves for increased effectiveness in the activities of the flow lines is to reduce the length of time involved in the rebasing, setting up and striking the work. For this it is essential to increase the mobility of the resources in line construction, to establish permanent interproject flows and prepare future work fronts (for 3-5 years). A significant reserve is increasing the organizational level of construction on the main pipelines with a diameter of 1,020 mm and less. The annual rate of the flow lines in building them is 2.5-fold less than on pipeline routes with a diameter of 1,220-1,420 mm while the proportional amount of them is 40 percent of the overall length of pipelines being laid.

Year-round pipeline construction. A most important problem is to work out and organize year-round construction of pipelines on swamps and flooded terrain. This is being carried out in two stages in a large-scale experiment.

During the first stage the work is being carried out on the basis of the VNIIST recommendations which include actually tested production ideas for carrying out the entire range of work in swampy areas, considering the types, depth, the degree of flooding and woodedness of the swamps, the characteristics of the flooded mineral soils and the properties of the permafrost rock. The new production plans make provision for utilizing both cross-country transport, earth moving, construction and special swamp-crossing as well as conventional equipment with the building of temporary work roads. The first stage is now being carried out in Glavsibtruboprovodstroy [Main Administration for Siberian Pipeline Construction] and Glavvostoktruboprovodstroy [Main Administration for Eastern Pipeline Construction]. In the second stage they will work out and conduct an experimental testing of new promising methods for laying the pipelines on the basis of special swamp-crossing equipment with ganged pipeline building units which integrate all the production processes and methods of construction. Among these methods are laying from air cushion platforms, using equipment on pneumatic propulsion devices from a line of built-up ground using hydraulic equipment, the method of unraised laying as well as methods which envisage the use of special experimental transport and construction swamp-crossing equipment which will become the basis for working out new and improving present production systems for building pipelines in inaccessible and flooded areas.

New classes of pipelines. On the basis of the modern concepts of fully mechanized high-speed flow execution of all types of construction and installation work considering the specific features of the multilayer pipe, theoretical and experimental research have been carried out. The results of this have made it possible to disclose the main patterns of building pipelines 1,420 mm in diameter for a pressure of 10-12 megapascals and find the optimum ideas for building the line portion, to clarify the design of the multilayer pipe, to work out new production schemes for carrying out the welding, installation-application and other jobs and to formulate the basic demands for their mechanization. The construction procedures developed by the institute have been tested in building two experimental sections in the middle zone and in Western Siberia and have provided an opportunity to begin laying a 300-km gas line section using multilayer pipe. The construction of this section will make it possible to finally

formulate the demands made upon the designing of the new class of unique pipelines, as well as on their construction and operation.

Methods of building pipeline using factory-insulated pipe. The industrialization of the production processes to a great degree determines the level of technical progress in pipeline construction. Factory insulating of the pipe directly contributes to this but at the same time requires special construction methods using such pipe. Here it is essential to minimize damage to the plant coverings and create effective methods and equipment for insulating the welded joints.

On the basis of the results of theoretical and experimental research and the solutions found for the technological, technical and organizational questions, a method and organization have been worked out for building pipelines using factory-insulated pipe. Already around 2,700 km have been built and in 1984 approximately 1,200 km of pipeline using factory-insulated pipe will be built.

The ways for further developing technical progress in this area include developing stronger insulating materials and protective coverings for the pipe and insulating the joints, fundamentally new mechanisms for their cleaning and insulating as well as improving the mechanical equipment for handling the insulated pipe.

The construction of field pipelines. The increased scale, importance and specific features of building field pipelines, the diversity of their design and the complexity of the soil and climatic conditions for their laying (regions of Western Siberia and Central Asia)--all of this requires an increased technical and organizational level for building such pipelines. The efforts of the scientists, designers and production workers are focused on elaborating optimum variations for the engineer preparations and the various design ideas for laying the pipelines in winter and summer, at increasing the level of industrialization (the maximum execution of welding and insulating work at the bases), creating more advanced methods and equipment for cleaning, flushing out and testing the pipelines considering their year-round construction, increasing the demands on pipe quality and particularly pipe geometry, as well as maximum plant fabricating of the connecting pieces.

The building of underwater crossings. In the 11th Five-Year Plan the task has been set of introducing the methods of building underwater pipeline crossings which are equal to the basic line of 1,420 mm and which would significantly reduce the metal intensiveness, the amount of earth moving and shore-strengthening work, exclude the building of shore chambers for receiving and releasing clearing devices and reducing construction times. For carrying out this task the VNIIST together with other organizations has carried out a range of scientific research and design work. As a result, methods have been developed for forecasting the scouring of river channels and reservoir banks in the crossing areas, for selecting optimum conditions for the operation and construction of the crossings, calculating the filling of the underwater trenches and the methods of their stage-by-stage construction. Forecasting the scouring of the river channels for the operational period has made it possible to determine the optimum deepening of their bottom with protection against possible mechanical damage and the minimum amounts of underwater earth moving. An analysis of the reasons for the failures for the underwater pipelines has made it

possible to work out normative demands for increasing their reliability and reducing the excess pipeline capacity at the crossings.

The technical ideas proposed for laying underwater pipelines using powerful winches have made it possible to build underwater crossings with a diameter of 1,420 mm and up to 2,000 m long.

For the lead construction of 1,420-mm underwater crossings, a method has been developed for the combined excavation of the underwater trenches. Such methods have already been introduced on 45 lines of crossings. Here they have used new designs for circular reinforced concrete weights which replace the iron ones.

The promising method developed by the VNIIST for building 1,420-mm pipeline crossings over water obstacles using the drilling method fully excludes the opening of trenches on the river bottom and the open laying of the pipeline. The tunnels for the pipeline are drilled deep beneath the river channel and this solves the problem of protecting the environment. On the economic and social level, the introduction of the new methods can provide the following effect: the construction pace rises by 2-3-fold, each drilling rig provides an effect up to 1.4 million rubles a year, there is no need for a weighting system, labor expenditures are reduced by 2-fold while the amount of operations performed manually declines by 4-fold.

Welding. On the basis of complete research a number of mechanisms in the welding processes has been more fully disclosed and a study has been made on the influence of various technological factors on the kinetics of the forming of the weld joint and its quality. This has made it possible to set the directions for a long-term technical policy in the area of welding pipelines with a diameter of up to 1,420 mm using various grades of steel, including new ones, when these pipelines are built and operated in various soil and climatic conditions and transport various products.

During the 11th Five-Year Plan, it is essential to weld more than 10 million pipe joints, around one-half of which will be on main pipelines. In terms of a single line of pipe, the length of the welded seams will exceed 80,000 km. Here the melting of around 50,000 tons of metal is required.

The carrying out of the large and growing volume of welding installation work is envisaged in the sectorial program primarily by mechanizing, automating and robotizing these jobs.

At present 50 percent of the joints is welded manually. Around 8,000 overhead welders are welding the fixed joints and the first layer of the seam of turning joints. An analysis of the failures of the weld joints indicates that these, as a rule, occur due to flaws in the manual welding. In accord with the program, by 1985 the amount of manual joint welding is to decline to 40 percent and in subsequent years to 15 percent.

One of the main areas of improving joint welding is to employ methods for the simultaneous forming of the weld joint along the entire generatrix and the entire section of the pipe bead as this excludes the consumption of welded metal. Electroresistance welding meets these requirements. It will hold the leading

place and will be used on 60 percent of the weld joints. The acquired positive experience of employing this method has shown the possibility of welding joints on the turn angles. For this there must be internal devices which can pass through the turn angles. A prototype of such a unit is now being developed by the Electric Welding Institute imeni Ye. O. Paton, the VNIIST and the KF [abbreviation unknown] of the Gazstroymashina [Gas Line Construction Machinery] SKB [Special Design Bureau].

Other welding methods are being improved and the equipment for using them is being developed. In particular, arc methods of automatic welding have not lost their importance. As is known, in welding on bases of the BTS-142 type by the two-sided automatic welding (without a preliminary manual backing), improved productivity and welding quality are achieved. There are plans to use these methods widely. A higher economic effect is provided by the bases of the IK-86 type which are presently being developed for automatic welding. In the long run these bases will be robotized and their productivity will double in comparison with the BTS.

In the sector there is also positive experience in using units of the "Styk" [Joint] and "Duga" [Arc] types in welding the nonturning joints of pipelines with a powder wire and in a shielded arc. The broader use of these for welding large-diameter pipe is envisaged in the program. Each of these units has its merits and shortcomings. At present, following the recommendation of the VNIIST, the questions are being worked out of developing a robotized complex of the "Avangard" type which combines the advantages of both designated methods. In relying on the basic methods for welding the line portion of the main pipelines, the VNIIST is continuing to develop fundamentally new and promising methods for connecting the pipes including soldering, laser welding and so forth.

One of the most labor intensive jobs is welding the lashings and welding in the catheads, reinforcing and connecting pieces. In these operations it is essential to mechanize both the cutting and the welding processes. For welding the root of the weld for the lashings, catheads and connections with a diameter of 1,020-1,420 mm, it is essential to have self-propelled welding units (capsules) with life support and a welding current source. The work of these complexes in the future can be oriented at using not only manual but also mechanized welding methods.

Ensuring high-quality welding, primarily the welding of the root, particularly on small-diameter pipes in compressor and pumping stations and oil fields, can be achieved in using argon-arc welding with the delivery of the flux-cored wire to the arc. The process can be done manually or using automatic equipment which is already produced by industry.

Thus, the introduction of the listed methods and welding equipment will make it possible in the long run using press methods (electroresistance welding and soldering) to complete 80 percent of the weld joints, with laser welding employed on 7 percent and the remainder by other methods.

Quality control of weld joints. The basic direction for further improving nondestructive quality control of the weld joints of main pipelines is to increase

its effectiveness by maximum mechanization and automation of all the processes, by reducing costs as well as by increasing sensitivity in the aim of increasing the reliability of information on the true state of the joints which largely determines their operating reliability. Here it is proposed that we develop the entire presently employed range of methods of flaw detection including radiation, magnetographic and ultrasound flaw detection, since only comprehensive nondestructive control ensures the actual realization of the advantages inherent to the various physical methods of control.

It is essential to emphasize that the crucial parameter in assessing the soundness of the weld joints is the dimensions of the production flaws and primarily their depth. The VNIIST is conducting thorough theoretical and experimental research on the evermore precise determining of flaw sizes (particularly depth) as well as assessing their influence on the strength of the pipeline welded joints. The givens of the problem are very complex and they cannot be solved unilaterally.

For increasing the objectivity of control, a major role is played by automating all the processes, including the development of multifunction robots which exclude the influence of the flaw detection operators on the results of the control, for example, intrapipe systems which select the joint for inspection and carry out this inspection, devices for decoding the results of inspection and so forth.

Extensive theoretical and experimental work is being done to develop automated ultrasound units, including those employing electric scanning over the entire area of the welded joint section. Research has been completed in the area of automating the ultrasound inspection of weld joints of different-diameter pipelines. New technical ideas have been worked out. In 1984, there will be interdepartmental testing of the experimental models of the automated ultrasound units.

A predominant majority of the institute's developments has been put into production. Thus, for the first time in the Soviet Union, we have developed and introduced a series of small-size pulse X-ray devices of the IRS, RINA, MIRA and NORA types, the GT-SSh rolled X-ray film and a magnetographic laboratory. Of the recent developments carried out quickly we must mention the development of the world's first self-propelled pulse X-rayed units of two modifications. The annual economic effect from their introduction is 189,000 rubles.

In 1982, development was completed and in 1984 equipment will be widely introduced for the automated photoprocessing of X-ray films in roll-type developers and this will provide an economic effect totaling 138,000 rubles and make it possible to reduce processing costs by virtually 2-fold.

In 1984, self-propelled intrapipe gamma-ray flaw detectors will be introduced for automated panoramic scanning of the ring seams in a line of pipelines from 219 mm to 1,420 mm in diameter (a development under the cooperation plan with Bulgaria) and these will provide an economic effect totaling over 3 million rubles a year. The annual savings in labor expenditures will exceed 33,000 man-days.

Comprehensive protection. During the 10th Five-Year Plan a range of studies was completed on improving and developing new insulating pipeline materials including: high-insulating grounds, polymer insulating film with an adhesive layer from butyl rubber, polyethylene wrapping, bitumen-rubber mastics, heat-resistant insulating tape (up to 120° C), and heat-setting tape the production of which has been developed and is being developed in the current five-year plan at domestic plants. Using developments of the VNIIST, the Syzran and Novokuybyshev plants are producing ground and film materials.

For insulating weld joints, we have developed light- and heat-stabilized thermal-setting films which are resistant to cracking in corrosive media, with low shrinkage stress and a degree of orientation (on the order of 10 percent) and possessing adhesive properties on the level of the best models of materials produced by foreign firms. The Novokuybyshev plant has begun operating a shop producing the heat-setting tapes.

In line with the intensive development of pipeline transport, the increased pipeline diameter, the higher pressure and temperature of the transported products as well as the discovery of deposits with a gas temperature up to 100° C, the need has arisen of developing heat-resistant insulating materials which protect the pipelines for a long time against corrosion at temperatures of 100-120° C. For solving this problem, two types of materials have been developed. One based upon the organosilicon rubbers and the other a radiation-modified polyethylene. Under the first variation industrial production has already commenced in the form of a heat-resistant LETSR-LPT insulating tape and under the second, an experimental industrial batch has been produced which is now in the testing stage. Industrial production has started on inhibited ground materials the GT-754IN and GT-760IN and this fully satisfies the sector's needs. At present, the development of a new polymer ground is being completed. This ground along with high protective properties possesses a range of increased physicomechanical properties in comparison with the widely-employed foreign grounds.

For factory insulating of the pipe, domestic compositions of polymer materials have been developed and these are applied to the pipe by the spraying method in an electrostatic field and by the extrusion method. At present, the pipe-rolling mills have begun producing pipe with epoxy and polyethylene covering. Also promising are the inorganic glass-enamel coverings and the method of induction pipe enameling developed by the VNIIST. At present, our nation is the first in the world to begin production of the two-sided enameling of thin-walled pipe for land reclamation construction at the Penzvodprom [?Penza Water Management Industry] Association.

For increasing reliability and optimizing the technical ideas and methods of electrochemical protection, the VNIIST has worked out and introduced automatic production systems of cathode protection with low-soluble nonmetallic anode grounds and a power supply on the territory of the compressor stations without having to build special power transmission lines along the route; there is also a new method and equipment for assessing the true protection of the pipeline with their cathode polarization with the prospect of converting to automatic complete monitoring of the protection potentials using the cross-country tracked

PEL-EKhZ; there is a new method and range of equipment for contactless nondestructive monitoring of the integrity of the insulating surfaces of underground pipelines with digital display of the monitoring results.

For the first time in the nation the VNIIST has worked out and Gosstandart has approved a normative State Standards Document "Steel Main Pipelines. General Technical Demands on Protection Against Corrosion." This document has synthesized the results of years-long research by the VNIIST and the other scientific research institutes as well as the practical experience of the Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] and the operational experience of the Ministry of Gas Industry and Ministry of Petroleum Industry. Its introduction and implementation by the design, construction and operational organizations will reduce pipeline failures caused by underground corrosion.

Quality and reliability. Scientific and technical progress has raised the problem of providing quality and reliatility to among the most important.

Control of quality and reliability on the main lines under construction represents a complex scientific-technical, organizational and socioeconomic system aimed at establishing, ensuring and maintaining the required quality level in all stages of its formation, including the elaboration of the normative base, designing, manufacturing (materials and structural elements), construction and operation of the pipelines.

The sector is carrying out a scientific-production program for improving construction quality and the reliability of the main pipelines. The scientific basis for the program has been the elaborated methodology of reciprocal coordination of the tasks of shaping the quality and reliability of the main pipelines and making it possible to move on to the active methods of controlling these factors. Such a methodology has made it possible to create a probability model for the failure-free operation of the line portion of the main pipelines and represent it as a single system of successively and tandem connected elements of end reliability. The model makes it possible to analyze the dependability of the structural elements individually and for the system as a whole.

In this context of great importance is the sectorial standard "Reliability in Equipment. Construction of Main Pipelines. Terms and Definitions (Sectorial Standard 102-80-83)" which was worked out for the first time.

An analysis of failures shows that in the 11th Five-Year Plan their frequency has declined by 3-fold in comparison with the 9th Five-Year Plan and by 1.5-fold in comparison with the 10th. This has been the result of implementing the measures envisaged in the "Comprehensive Scientific and Production Program for Improving Construction Quality and Reliability of Main Pipelines." The carrying out of this program is one of the most important tasks for scientific and technical progress in the sector.

10272
CSO: 1822/290

USE OF NEW WELDING METHODS, EQUIPMENT DESCRIBED

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 4, Apr 84 pp 10-12

[Article by I. A. Shmeleva of the VNIIST: "Development Prospects for Submerged Arc Welding Equipment and Methods in Pipeline Construction"]

[Text] Increased effectiveness in welding and installation work in pipeline construction can be achieved both by developing new resource-saving production processes and equipment as well as by improving the welding methods and units widely employed on the route. It is possible to build around 14,000 km of pipeline a year with minimum labor expenditures only by continuously increasing the productivity of the welding processes as well as the quality and reliability of the welded pipeline joints. For this reason one of the main tasks confronting sectorial science is to achieve a high degree of mechanization and automation not only in the basic production processes but also in the auxiliary operations [1].

Submerged arc welding is one of the best developed and widely employed methods ensuring the mechanization of the process with a stable high quality of welded joints. In pipeline construction this method was first employed in building the Dashava--Kiev pipeline and while being constantly improved for 40 years now it has been the basis of industrializing welding.

As is known, submerged arc welding is employed at the pipe welding stations which deliver the pipe sections for constructing the continuous line of the pipeline and thereby have a substantial influence on the rate of construction. The pipe welding stations operating in the "rear" of the route workers, in parallel with them, make it possible to add two complete joints welded under semi-stationary conditions and guaranteeing high quality to each joint welded on the line section of the route. This ratio as yet cannot be extended to productivity, that is, it does not always mean that two turning joints are ready over the same time that one fixed joint is welded on the line. This is explained by the fact that on the line new mechanized welding methods have also appeared including butt resistance welding the productivity of which already surpasses the productivity of submerged arc welding of the joints. One submerged arc welding post at the pipe welding stations makes it possible to weld 3.25 joints an hour for pipe of 1,420 x 15.7 mm while the productivity of the Sever-1 resistance welder for the same pipes is 6-8 joints an hour (calculated data).

Seemingly, these indicators should cast doubt on the advisability of further utilizing the pipe welding stations in pipeline construction. Such ideas have recently been voiced but they have not found economic reinforcement. According to the data of the VNIIST [All-Union Scientific Research Institute for Pipeline Construction],* the cost of 1 km of pipeline welded using the pipe welding stations is less than a pipeline welded into a line from individual pipe. A comparison of welding expenditures per km of pipeline using the Sever-1 equipment from individual lengths and from three-pipe sections prepared at the BTS-143 station indicates that in the latter instance the adjusted expenditures are 36 percent less than in the former.

The advisability and effectiveness of using the stations in pipeline construction is determined by a number of circumstances. First of all the stations provide an additional opportunity for breaking up the operations in carrying out welding-erection work and thereby help to increase the pace and reduce the cost of construction.

Welding at the stations is one of the main prerequisites for year-round construction. In providing an opportunity to carry out welding work during the muddy season and at times of the year inconvenient for erecting a pipeline on individual sections of the route, station welding makes it possible to maneuver the manpower and equipment without lowering the construction pace.

An extremely important circumstance which determines the effective use of the pipe welding stations is the changeover to building several lines of a pipeline in a single corridor. Under these conditions, it is not required to rebase the equipment virtually over the entire period of its operation. Stations are near the pipe unloading stations and are linked to the route by permanent roads.

A strong argument in favor of station welding is the bringing of working conditions closer to plant ones. This tells positively on the quality of the welding joints and at the same time broadens the opportunities for mechanizing and automating the labor-intensive work.

The development of new highly-productive welding methods, in particular, flash-butt resistance welding, should lead to a situation where this method begins to be employed not only in welding the butts into a continuous line on the route but also at the pipe welding stations. Thus, even now PLT-321 units are being introduced for resistance welding under semistationary conditions for small-diameter pipe: from 114 to 325 mm. The effect from utilizing these units is determined not only by the advantages of resistance welding as a method (high productivity) and the comparative simplicity of the equipment in line with the small pipe diameter (the small overall dimensions, weight and required power) but also by the relative complexity and ineffectiveness of using submerged arc welding for such pipe. In the future it will be advisable to broaden the range of pipe diameters which can be welded by resistance welding at the pipe welding stations up to 720 mm. The data of the VNIIST indicate that resistance welding on pipe 529 mm in diameter at the station is 2.5-fold more economic than submerged arc welding.

---

* Calculations were made by I. V. Knyazhinskaya.

For manufacturing at the stations pipe sections which are 1,020-1,420 mm in diameter, it is advisable and effective to employ submerged arc welding. The equipment and well tested methods for such welding provide guaranteed quality of the weld joints which is easily inspected by known methods employed in pipeline construction. The equipping of the modern pipe welding stations for two-sided submerged arc welding operates dependably, providing for the welding of 20 joints for pipe 1,420 mm in diameter per shift and this corresponds to the average operating productivity of the Sever-1 unit [2].

Submerged arc welding technology, in providing a good clean shape with a smooth transition of the strengthening to the base metal is very flexible and within a certain range makes it possible to vary the properties of the heat-effected area without detriment to the seam quality. This technology does not require mechanical working of the seam, the preliminary or additional heating of the joint and it provides the required properties, including sufficiently high resiliency without subsequent heat treating.

The technology of submerged arc welding has long been employed not only in pipeline construction but also in industry and for this reason we can clearly see the ways for carrying out various production tasks related to a change in the structure, the organizational forms of the equipment and methods of pipeline construction. These tasks as they arise can be effectively settled.

The noticeable increase in the operating pressure in the pipelines to 10-12 megapascals requires pipe either of new, high-strength steels or from steels of the strength classes and grades presently worked by welders but with increased wall thickness. Such pipelines should possess increased reliability and capacity, including at low temperatures.

In welding high-strength steels we must ensure a new level of metal properties in the seam, the heat-effected area and the entire weld joint as a whole. This can be achieved by employing new welding materials (wires, fluxes) for pipeline construction and which make it possible to obtain a seam metal which is equally strong as the pipe metal and possesses increased resilience under the temperatures of operating and building the pipeline. The regulating of the welding heat cycle (a change in the rate of cooling the weld joint within a certain interval of temperatures by changing the linear energy of the weld) should, on the one hand, have a beneficial effect on the contents of the metal seam properties determined by the welding materials and, on the other, provide the set properties of the heat-affected area so that the aggregate strength and deformability of the weld joint guarantee its operational reliability. This is a difficult task since the present-day methods of increasing the strength characteristics of pipe steels are rather diverse and cause a varying response of the steel to the welding cycle.

The production task of welding pipe with a wall thickness of over 21 mm is somewhat different. Although the chief aspect as before is ensuring the quality of the weld joint and for this it is essential to alter the welding conditions (the cooling rate with the same linear welding energy is changed by altering the thickness of the pipe wall), problems arise of seam formation and slag removability in welding at a high speed in deep grooves. With the presently-used welding materials and welding equipment, its high rate (over 30 m per hour) and

slag separability in deep grooves are incompatible. The joining of thick walled pipe requires a complete revision of the welding methods, starting from the change of grooving and the welding materials and ending with the welding procedures and equipment. Here the necessity of maintaining existing welding productivity or even increasing it should involve the forcing of conditions and the use of new production procedures which increase the effectiveness of the process and the productivity of filling the groove with the filler metal. This, in turn, requires an additional coordinating of the welding conditions with the quality of the weld connection.

The stability of quality (from butt to butt and around the perimeter of the joint) and reducing the flaw level of the weld joint should be indispensable conditions for carrying out the set production tasks. The latter is very timely even now in welding pipe with a wall of ordinary thickness employing the developed welding procedures and materials. According to foreign data, the average flaw level with two-sided submerged arc welding at pipe welding stations and with inspection (100 percent) of the weld joints by exposure to radiation is 1.6 percent of which 0.1 percent are completely faulty joints [3].

The successful carrying out of the set production tasks and the realization of these ideas in practice are inseparably linked to improving the equipment. The achieving of high-quality welded joints with stable quality even in the instance when this is fully guaranteed by the welding methods, is possible under the condition of reproducing the method on mechanized and automated equipment. Only equipment the operation of which does not depend upon the welder can reduce the flaw level of the weld joints, increase productivity and provide high efficiency of the employed production process. The productivity of manufacturing the pipe sections on such equipment depends not only upon the welding methods but also to a significant degree upon the level of mechanization and automation in the auxiliary operations. The pipe welding stations of the BTS type which are presently operated in the sector, although providing virtually full mechanization of the work, as yet are unable to reduce the established flaw level of the welded joints. The joints welded at these stations require inspection by nondestructive methods. Automating the process of welding and the auxiliary operations to a significant degree is complicated by the shuttling of the pipes and sections within the station.

The most suitable object to be automated is the experimental stand which has been presently developed and which fully excludes the shuttle movements. The developing of an automated set of equipment based on this stand presupposes the automating of the following: the culling of pipe with damaged butt ends, the marking of good pipe, the moving of it to the position of preparing the edges, preparing the pipe edges according to the set program (both ends of one pipe or one each of two pipes), inspecting the quality of pipe preparation, delivering them to the assembly and welding position in the set sequence, simultaneous assembling of two pipe joints into sections, external welding of one seam layer, moving the section to the welding line, welding the remaining outside and inner layers of the seam and releasing of the finished section. The entire course of processing each pipe within the station is reflected on the control panel screen. For this reason the role of the operator is reduced to observing the process and intervening in it with the breakdown of the equipment or a disruption in the welding process, with the signal of this immediately going to the board.

The automating of the welding process itself presupposes the development of a control system which provides the necessary direction of the electrode's movement along the joint in the welding process both from the inside and outside the joint, the maintaining of the set conditions in the absence of changes in the welding conditions and the adaptation of the welding with the development of disturbances, for example, changes in the amount of clearance in the joint, the groove parameters and so forth. Such a system excludes the formation of the flaws related to a disrupting of the parameters of the welding mode and conditions. The recording of the basic parameters in the welding process will make it possible to obtain a document certifying the quality of the joint and either completely exclude the operation of inspecting the completed joints or reduce this to a selective inspection of individual joints. Possibly the detection of random flaws can be combined with the welding process and then there will be no need for inspection. The automating of the welding process requires the carrying out of special research which should determine and in a mathematical form (as an algorithm) express the conditions for the forming of a flawless welded joint with a set geometric shape and properties.

According to preliminary estimates, the productivity of an automated station rises to eight joints an hour. The number of workers in a brigade operating the station will decline to four. Considering the excluding of the inspection operation from the production cycle, one can expect a substantial decline in the cost of welding a joint at the station.

However, both the new efficient methods and the improved welding conditions cannot exist in isolation from an appropriate level of organizing the work and cooperation of the station with the section of the route served by it. Improving the presently employed organization of the work will make it possible to realize reserves in turning-pipe welding in the near future without waiting for the development of new methods and equipment.

One of the most important conditions for the effective cooperation between the pipe welding station and the line is the synchronizing of their work. The pipe welding station which welds two joints an hour in pipe 1,420 mm in diameter, with two-shift work, can provide sections for the flow line operating at a productivity of up to 0.75 km per day. If the station begins its work during the period of the preparatory operations on the route and by the moment of starting the welding into the line can provide a backlog of ready sections, then this will correspond to lines with a productivity of up to 1 km per day.

The highly productive stations such as the BTS-143 should operate with highly productive lines which weld at least 1.5 km of pipeline a day. The future automated station is to be combined with a highly productive flow line which will complete up to 3 km per day, for example, with the line on which the resistance-welding Sever unit operates. Under the condition of employing automated pipe welding stations with units for resistance welding on the route there can be a more flexible approach to choosing the optimum section length. It may be advisable to have welding at the station of two-pipe sections the transporting of which is cheaper than the three-pipe ones. In this instance, the brigades working on the route and at the station should provide the same productivity.

The increased productivity of the station with low productivity of the flow line is not advantageous. In serving one flow line, the base will stand idle and with two the distance of transporting the sections will increase. With an increase in the distance of the station from the line from 50 to 100 km, the transporting cost depending upon the employed means of transport increases by 31-37 percent.

There still are other reserves the use of which can substantially increase the effectiveness of the existing pipe-welding stations. For example, the locating of them in a shelter which further brings the working conditions at the stations to plant ones and hence not only increases productivity but also raises the welding quality.

An important question requiring an immediate solution is the organizing of preventive maintenance and repair at the pipe welding stations. There has long been a need for establishing special brigades concerned with the inspection and routine repair of the equipment during the breaks between shifts. The reliable operation of the stations and their efficient use can be increased by introducing the unit-assembly method of machinery repair and an automated system for controlling the stocks of assemblies, units and spare parts.

The automated stations should be put into use by highly skilled specialists. In this context the creating of specialized starting-up administrations is assuming ever-greater importance.

The state and planned ways of developing submerged arc welding in pipeline construction make it possible to assume that in subsequent years the level of employing this method at the pipe welding stations for pipe with a diameter of 1,020-1,420 mm will be at least 40-50 percent.

The necessity of further automating the pipe welding stations has been brought about by an improvement in the welding methods for nonrotating joints. These two processes are most closely interlinked and determined by the overall progress in pipeline construction.

BIBLIOGRAPHY

1. Shcherbina, B. Ye., "The Fourth, Decisive [Year]," STROITEL'STVO TRUBOPROVODOV, No 1, 1984.

2. "The Use of Electric Resistance Welding by Integrated Production Flow Lines," STROITEL'STVO TRUBOPROVODOV, No 1, 1983.

3. Marzoli, I., Scopesi, L., "The Use of API 5LX-X70 Steel in the Trans-Tunesian Pipeline," DOCUMENT IIW-XIE-3/82.

10272
CSO: 1822/290

PIPELINE CONSTRUCTION

PLANS FOR DEVELOPMENT OF COAL, ORE SLURRYLINES REVEALED

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 4, Apr 84 pp 16-17

[Article by Ye. P. Olofinskiy of the VNIIPIgidrotruboprovod: "Pipelines for Transporting Coal and Ore Concentrates"]

[Text] One of the urgent tasks which should be carried out in the 11th Five-Year Plan and subsequent years is the establishing and development of main slurryline transport for coal and ore concentrates. The need for such systems has been increasing particularly under the conditions of the overloaded main rail lines.

In 1983, a program was set up for developing pipelines to transport coal and ore concentrates over large distances. The Ministry of Construction of Oil and Gas Industry Enterprises was given the functions of the head organization, including the scientific research and design work and the building of the main slurrylines under "turnkey" conditions with the delivery of ready-to-operate structures to the client.

As the primary projects for large-diameter slurrylines for solid materials, they have planned the Belovo--Novosibirsk coal line and the ore line between the Stoylenskiy ore processing combine (KMA) and Lipetsk.

In 1981-1982, the plans were worked out for an experimental-industrial pipeline for transporting coal for 256 km from the Inskaya hydraulic mine (Kemerovo Oblast) to the Novosibirsk TETs-5. The plan envisaged a method of pumping coal by concentrating it in a slurry up to 50 percent by weight and a particle size up to 1 mm. Such equipment has been tested out at existing industrial projects and includes a water-removal facility and final crushing of the coal before burning at the power plant. At present the coal line plan has been improved, proceeding from the possibility of pumping a water-coal suspension through the pipeline with a concentration of solid matter of 65-70 percent by weight while the size of the solid particles will not exceed 200 microns. Such a procedure possesses significant advantages. In particular, complex and expensive equipment is excluded at the power plant for removing the water and preparing the coal for burning. The required volume of coal will be pumped through the pipeline having a diameter of 530 mm without increasing the power and number of pumping stations.

However, not all the questions related to carrying out the coal line plan using the new method have been resolved. For this reason, research is being conducted on the experimental units of the VNIIPIgidrotruboprovod [All-Union Scientific Research and Design Institute for Slurrylines] on the hydrodynamic properties of highly concentrated coal-water suspensions using additives which reduce the viscosity of the mixtures.

The setting up of the Belovo--Novosibirsk experimental-industrial coal line will make it possible to work out the production processes and equipment for large branched systems for the pipeline transporting of coal from the Kuznetsk Basin to the thermal power plants of the Urals and subsequently to the central regions of the nation.

The system of slurry transport for the iron-ore concentrate to the Novolipetsk Metallurgical Combine some 220 km long includes a section for preparing the slurry, the pipeline with pumping stations, a filtration building and a concentrate storage area. Extensive scientific research has already been carried out including at the experimental base in Ramenskoye to determine the optimum production parameters of the slurryline. On the basis of the results of this work, materials have been issued with the necessary calculations and establishing the advisability of designing and building the designated system.

A comparison of the technical and economic indicators for the delivery of concentrate by hydrotransport and by rail showed the economic effectiveness of employing pipeline transport. Capital investments for building a hydropipeline are 3 million rubles less than for the reconstruction of the railroad while operating expenditures are reduced by 4.8 million rubles a year with the number of service personnel declining by 12-fold.

At present, together with the institutes of the USSR Ministry of Ferrous Metallurgy, plans are being worked out for a concentrate line and the start of its construction has been planned for 1986.

For carrying out the planned program for establishing mainline systems for the hydrotransport of coal and ore concentrates, including the first projects of Belovo--Novosibirsk and the Stoylenskiy Ore Processing Combine--Lipetsk, the machine builders should promptly develop the production of the special equipment, above all the slurry electric pump units with a productivity of 400-800 m^3 an hour and an operating pressure up to 10 megapascals as well as wear-resistant valve, control and safety fittings. The designated types of equipment have been incorporated in the quotas for the specific comprehensive scientific-technical program. In 1984, testing should be carried out on the experimental models of the GNPA 400/100 hydraulic-drive pump and the full-passage ball cocks for hypothetical parameters of 400 and 500 mm and an operating pressure of 10 megapascals. The organizations of the Ministry of Instrument Making, Automation Equipment and Control Systems, according to the technical requirements of the Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises], are to begin producing the special monitoring and metering devices including induction flow meters and pressure sensors.

The Minneftegazstroy at the range in Ramenskoye is establishing a scientific experimental base for laboratory and large-scale research on the methods of the

hydrotransport of solid materials as well as testing of experimental models of the developed production equipment and monitoring and metering instruments. The full cost of the planned experimental installation is 10.5 million rubles. In 1984, the first stage of structures with a cost of around 6 million rubles will be put into operation.

The development of the first industrial mainline systems for the hydrotransporting of coal and ore concentrates, Soviet-produced production equipment and experimental testing units will be the essential scientific and production facilities for the further development of this effective type of transport in the national economy.

10272
CSO: 1822/290

PIPELINE CONSTRUCTION

NEW EQUIPMENT FOR PIPELINE CONSTRUCTION EXAMINED

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 4, Apr 84 pp 19-21

[Article by Ye. P. Kovalev of the Gazstroymashina SKB: "Sets of Special Equipment for Building Main and Field Pipelines"]

[Text] During the 11th Five-Year Plan, the construction organizations of the Minneftegazstroy [Ministry of Construction of Oil and Gas Enterprises] must lay over 56,000 km of main pipeline and around 38,000 km of field pipeline. Just the length of the system of gas mainlines with a diameter of 1,420 mm from the Urengoy Deposit to the various regions of the nation will surpass 20,000 km. The building of pipelines of such length in very short times is possible by the full mechanization of construction and by developing and introducing new highly productive equipment of great unit capacity and adapted for operating under difficult natural and climatic conditions.

The scale and scope of the task of developing the fields of Western Siberia and building large-diameter pipelines have confronted the sector's designers, scientists and machine builders with the problem of developing equipment which will form integrated sets with a high level of mechanization for building pipelines of any diameter, starting from 57 mm to 1,420 inclusively. Even now, the mechanization level in building pipelines with a diameter of 1,420 mm has reached 99.7 percent.

Due to the fact that the greatest amount of work occurs in building pipelines with a diameter of 1,020-1,420 mm, basic attention has been given to mechanizing and automating the construction of precisely these main lines. The sector's as well as the enterprises of other ministries and departments annually manufacture more than 10,000 units of machines, mechanisms and equipment of some 140 type of using plans of the Gazstroymashina SKB [Gas Line Construction Equipment Special Design Bureau].

For opening trenches, wheel-type and single-bucket excavators are used. In wintertime, the wheel-type trenching excavators are employed making it possible to open trenches in frozen ground to the complete depth without preliminary loosening. The opening up of oversize trenches in the winter period is done in combination with blasting. If the trench is not frozen to the complete depth, the wheel excavators are used for cutting through the frozen layer with subsequent completion to the planned depth and width by the single-shovel excavators.

In building main pipelines, the ETR254 wheel-type trenching machines have become most widespread as these make it possible to open a trench to 2.5 m deep and 1.8-2.1 m wide. Since 1978, these machines have been serially produced by the Moscow Experimental Machine Plant. An excavator with a power of 221 kilowatts on nonfrozen ground of categories I-II provides a productivity of up to 1,200 m^3 per hour, in freezing to a depth of 1.2-1.4 m, 500-600 m^3 per hour and with the complete freezing of the ground to 150 m^3 per hour. On the basis of this excavator the modification ETR254-01 has been developed for digging trenches 1.2-1.5 m wide. The given machine provides a productivity of up to 900 m^3 per hour on unfrozen ground of categories I-II. On the basis of the tractor of the ETR254 excavator, the EF251 bucket wheel excavator has been developed. The width of the wheel is 0.3 m with a trench depth to 2.5 m.

The modernization carried out by the Gazstroymashina SKB on the ETR254 excavator has basically been aimed at increasing the reliability and durability of its assemblies and improving the working conditions for the operator. The power of the modernized excavator will be increased to 256.7 kilowatts.

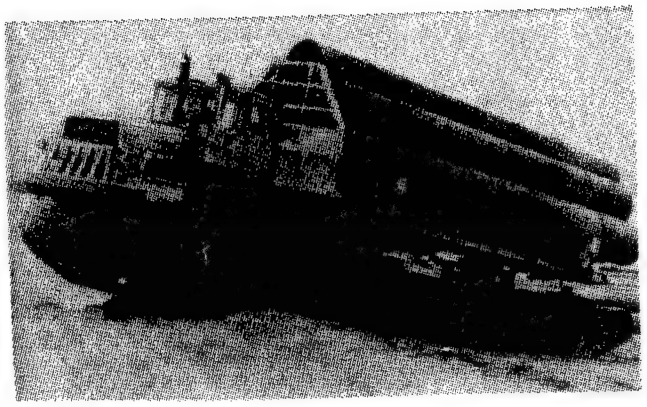
The plants of the Ministry of Construction, Road and Municipal Machine Building, according to plans of the Gazstroymashina SKB, are serially producing the ETR204, ETR223 and ETR224 excavators with a power of 118 kilowatts, making it possible to open trenches with dimensions of 1.2 x 2.0, 1.5 x 2.0 and 0.85 x 2.2 m. The given excavators are employed in various construction organizations of the country. In the sector the most widespread are the ETR 224 excavators which have high power making it possible to employ them for opening trenches in frozen ground.

For carrying out the task of the single-pass opening of a trench with a section of 3 x 3 m in permafrost ground for buried pipelines with a diameter of 1,420 mm, the I524 wheel-type excavator has been developed with a power of 809.6 kilowatts. The machine weighs 120 tons and the overall length is 29 m.

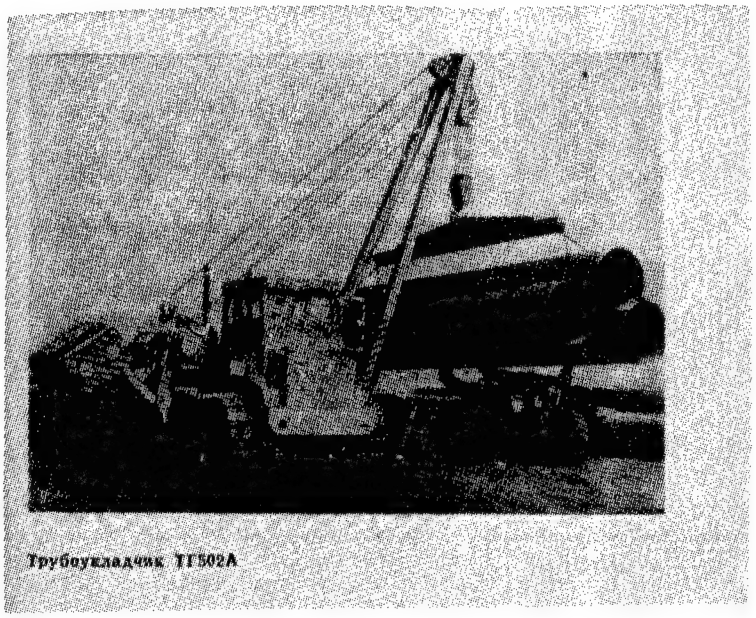
For opening trenches in rocky and frozen ground using blasting, the BM253, BM254 and BMSh321 drilling rigs are serially produced. The BM253 rigs are designed for the simultaneous drilling of two vertical blast holes with a diameter of 76 mm and up to 2.5 m deep in rocky ground of any hardness as well as in frozen ground. The BM254 rigs make it possible to drill in rock of any hardness and frozen ground blast holes with a diameter of 76 mm and to 3.2 m deep in various positions, including below the level of the rig. The BMSh321 drilling rigs are designed for drilling blast holes to a depth of 3.2 m in frozen ground. All the rigs are mounted on tractors and this makes it possible to easily move them along the route. The BM253 and BM254 rigs which operate on rock must be provided with mobile compressors for blowing out the hole and driving the pneumatic striker. For storing explosives under field conditions, industry is producing mobile storehouses of the SVM type and for transporting and charging the holes, the PVM mobile points based on the ZIL-131 vehicles.

In building underground crossings beneath highways and railroads up to 60 m long, the serially manufactured machines are employed for horizontal drilling and the simultaneous laying of steel tubular casings with a diameter of 325-1,420 mm. These are the UBG4, UGB5 and GB1421. The rate of cutting the shafts is 9-15 m an hour. For laying connectors with a diameter of 1,720 mm for the

The PV203 String Carrier



Tractor Pipe Carrier



The TG502A Pipe Layer

large-diameter pipelines, a batch of GB1621 drilling rigs has been produced making it possible to build crossings up to 60 m long. The drilling rate for the given rig is 1.4 m per hour. A more advanced and powerful GB1721 rig is being developed and this will provide an opportunity to significantly increase the cutting rate by reducing the auxiliary time.

TR 351

ETR 254

At present, series production is being started on the MTP72 excavators on a rubberized metal undercarriage making it possible to increase the durability of the traction system. The given excavators equipped with a backhoe with a shovel capacity of 1.0 m^3 in terms of their design conform fully to the EO1421 excavators.

In 1984, the design of the EO5123-2 excavator is being modernized and this will have a broadened and lengthened caterpillar track of the tractor type with a backhoe for digging trenches (a shovel capacity of 1.6 m^3 for ordinary ground and 1.25 m^3 for working heavy ground). The weight of this excavator is 36 tons.

For transporting pipe and pipe joints, the plants of the sector of other ministries and departments, upon the designs of the Gazstroymashina SKB are producing various means of transport on the basis of cross-country vehicles, wheeled and tracked tractors.

On the basis of the ZIL-131 and URAL-375 vehicles, the PV91 and PV92 pipe carriers have been developed with a capacity of up to 9 tons. After turning out several thousand vehicles of the given type, a new modernization has been started also on the basis of these vehicles but with diesel engines. Testing has been started on the PV95 pipe carrier. The given vehicle will have better speed performance as the engine power has been increased by 221 kilowatts in comparison with gasoline engines.

For many years the plants have manufactured string carriers based on the KrAZ-255 vehicle. In 1983, testing was completed on the new PV203 string carrier based on the KrAZ-260 vehicle. This powerful and high-speed vehicle makes it possible to transport triple-pipe lengths up to 36 m long from pipe with a

diameter of 1,420 mm. The vehicle conforms fully to traffic safety requirements. For increasing cross-country capability a three-axle trailer has been developed.

The PV96 pipe carrier is being developed on the basis of the KamAZ truck with a capacity of 11 tons in moving over improved and work roads.

For transport across swampy work roads, the PTG251 tractor trailer pipe carrier has been developed on a rubberized metal track. For operating in the southern regions of the nation, a wheeled PTK252 tractor pipe carrier is being manufactured.

The welding of pipe and pipe lengths. The pipe coming from the pipe plants with a length of 11.4-12.0 m, as a rule, is made up into three-pipe lengths 35-36 m long. The making up is done at field pipe welding stations equipped with the SST141 racks and the PAU1001V welding units. At the beginning of the 1970's, the BTS143 station was developed for assembly and two-sided welding of the three-pipe lengths. Several such stations were produced representing highly mechanized assembly-welding field plants and for a long time these were employed in the building of the major lines. The new, more convenient and simpler BTS142V station makes it possible to perform submerged arc welding. The station is equipped with an optical arc tracking system in welding the inner layer of the seam. The design of the station and its arrangement has been significantly improved in comparison with the BTS143. A binocular tracking system has been developed. At the produced BTS142V stations, a productivity of 2.5 joints an hour has been reached.

The automatic PAU502 field units have been developed for submerged arc welding to replace the PAU601 and PAU602 units. The productivity of the given units in welding pipe with a diameter of 325-820 mm into three-pipe lengths is 7 joints an hour. An experimental model has undergone preliminary testing and the production of a test batch is being prepared. Using the PAU502 equipment and the new assembly jig, the BTS81 station will be developed for welding pipe lengths with a diameter of 325-820 mm.

For electric resistance welding of nonturning pipe joints with a diameter of 1,420 mm, the Sever-1 system has been developed operating with a productivity of 6-8 joints an hour. There are plans to produce the experimental equipment of Sever-2 for welding pipe with a diameter of 1,220 mm and the same productivity. Development has been started on equipment for welding pipe 1,020 mm in diameter. For electric resistance welding of the nonturning pipe joints with a diameter of 114-325 mm, there is the TKUP321 equipment with productivity up to 10 joints an hour.

For panorama radiation inspection of the weld quality, the new AKP145 automated unit has been developed. The self-propelled dolly with program control and a radiation source can move through the pipe a distance of up to 2.5 km and come back. In 1983, the first batch of this equipment was produced.

For assembly of the pipelines, they use the internal hydraulic centralizers or TsV developed for joining pipe with a diameter from 325 to 1,420 mm. The centralizers for pipe with a diameter of 1,020, 1,220 and 1,420 mm are being manufactured in Poland under the designs of the Gazstroymashina SKB.

Smooth-bend curves are made using the GT531, GT1021 and GT1421 rigs for pipe with a diameter, respectively, of 219-529 mm, 530-1,020 mm and 1,220-1,420 mm. The GT1422 rig has been developed for pipe with a diameter of 1,220-1,420 mm with a short base making it possible to bend pipe 12 m long to 6° and 24-m pipe to 12°. The development of the D1423 mandrel for the GT1422 rig has helped increase the quality of the curve bend. This has made it possible to significantly reduce the ovalness in the pipe's butt end and body.

The development of an automated system for controlling the rig with the recording of the bend parameters will help improve the quality of the curves and provide tolerances conforming to the new State Standard. Development has started on a stationary increased-strength rig for obtaining a stable quality.

The use of films will help to increase the quality of pipeline insulating. For applying polymer materials combined insulating-cleaning machines of six sizes have been developed for pipes with a diameter from 168 to 1,420 mm. At present all sizes of the machines are produced in large amounts ensuring their introduction everywhere. For applying asphalt insulating on pipe with a diameter from 89 to 159 mm, the new IM151 machines have been developed and are being produced while the IM271 machines have been developed for pipe with a diameter of 168-273 mm. In the manufacturing stage are the prototypes of the IM531 machines for pipe with a diameter of 325-530 mm and the IM821 for pipe with a diameter of 630-820 mm. Final development is being completed on the plans for the BK-4 and UBK81 asphalt melting heaters.

Each year there is wider and wider use of pipe with factory and station insulating as a general rule. The PTB21, PTB51 and PTL1 pipe insulating lines are in service at a number of construction organizations. Several PTL2 lines have been produced for insulating pipe with a diameter of 57-426 mm and up to 36 m long. There are plans to produce the PTL2 insulating line combined with the PTL321 field line for resistance welding for pipe with a diameter of 57-426 mm.

For cleaning and insulating the pipe joints with a diameter of 1,020-1,420 mm, the IS101, IS122 and IS142 units have been developed and these can be rolled or moved from joint to joint. The machines by linkages can be connected with trolley suspensions and the insulating of the joints carried out simultaneously with the lowering of the pipeline into the trench, that is, operate by the "continuous lowering" method. The productivity of the IS101 unit is up to 10 joints an hour and the IS142 up to 6.

The pipelines are usually laid by the traditional continuous lowering method. For field construction and laying pipelines with a diameter up to 426 mm inclusively with a wall thickness up to 9 mm, the Gazstroymash Plant serially produces the TG61 pipe layer with a capacity of 6.3 tons. In the fields of Western Siberia, they widely use the TG62 pipe layer with a low specific pressure on the ground. Both these pipe layers have a strengthened undercarriage on the basis of the T130 tractors.

For laying pipe with a diameter up to 720 mm inclusively, the Ocher Machine Building Plant produces the TO1224G pipe layers. The design of a new model pipe layer the TO1224D has been developed and is based on the T130B tractor and conforms fully to State Standard 15619-70. For building pipelines with a

diameter up to 1,020 mm, the production of the TG201 pipe layers has been resumed in Ukhta. For building pipelines with a diameter of 1,020-1,220 mm at the Ocher Machine Building Plant they have organized production of pipe layers of the T356OM type based on the pipe laying modification of the D804-MKhLK tractor. Testing is being completed on the modernized TG502A pipe layers with a load capacity of 50 tons.

For laying the pipelines in the trench, various types of trolley suspensions have been developed. Suspensions with steel rollers for uninsulated pipe are manufactured by the Ocher Machine Building Plant. The sector's plants also produce trolley suspensions with polyurethane rollers.

For covering the laid pipeline with dirt, a batch of TR351 trench fillers has been produced. The given machines provide high-quality filling, even filling of the spaces underneath the pipeline and guarantee the protecting of any type of insulating. The productivity of the machine on unfrozen ground is 1,200 m^3 an hour. The productivity of the trench filler with a completely frozen mound of dirt is 500-600 m^3 an hour. The equipping of the trench filler with a special conveyor makes it possible to utilize it successfully for removing the fertile soil layer.

For hydraulic testing mobile filling and hydrostatic testing units have been developed with varying productivity; these are serially produced by the Lvov Machine Plant.

The AN261 filling unit with a capacity of 221 kilowatts on a truck trailer can be used for filling small-diameter pipelines. For pipelines with a diameter of 1,020-1,220 mm, the modular AN501 units are serially produced. These can be delivered to the test area by motor transport or by helicopter.

For testing pipelines with a diameter of 1,420 mm, the ASN1000 automated filling stations have been developed and are serially produced. The remote control board provides an opportunity to simultaneously control two or more stations. The AO161 hydrostatic testing units provide an operating and testing pressure.

For mechanizing loading operations, the ZTA101 automatic butt pipe grabs have been developed and these make it possible to employ jib cranes, as well as the ZTA102 for using pipe layers in loading and unloading pipe with a diameter of 1,020-1,420 mm and 9-12 m long. Soft pipe slings of varying load capacity have been developed and are serially manufactured.

The organizing of the series output of the new machinery, mechanisms and equipment and their introduction in erecting the main pipelines make it possible to accelerate the construction pace, to reduce the expenditures of manual labor and make the labor of the operators less intense, more intellectual and requiring high knowledge and skills.

10272
CSO: 1822/290

CATALOG DESCRIBING PIPELINE CONSTRUCTION EQUIPMENT PUBLISHED

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 4, Apr 84 p 23

[Unattributed announcement: "A Catalog of Machines for Pipeline Construction"]

[Text] In 1984, the publisher "Nedra" will produce a "Katalog mashin dlya stroitel'stva truboprovodov" [Catalog of Machines for Pipeline Construction].

The catalog gives information on the special machines developed by the Gazstroymashina SKB [Gas Line Construction Machine Special Design Bureau] and employed in the construction of main pipelines.

The entire range of machines has been reduced to seven catalog sections and has been classified by types of work: earthmoving equipment, equipment for building underwater crossings, materials handling equipment, welding equipment, equipment for the cold bending of pipe, equipment for cleaning and insulating pipe, various-purpose equipment.

The 7th Edition of the catalog has been supplemented by information on the new, more advanced machinery and mechanisms. Along with the serially produced machines, the catalog includes the machines which are in the stage of testing and design development and of interest for the construction and design organizations.

The catalog is designed for engineers and technicians employed in building main pipelines and other oil and gas industry projects.

Requests for acquiring the catalog should be sent to the following address: 111524, Moscow, No 12 Elektrodnaya Street, Gazstroymashina SKB.

The catalogs are sent out C.O.D.

10272
CSO: 1822/290

WIND-POWERED CATHODE PLANT FOR PIPELINE PROTECTION DESCRIBED

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 4, Apr 84 pp 45-46

[Article by V. V. Sidorov and V. K. Pavlov: "Wind-Powered Cathode Electric Plants for Protecting Pipelines"]

[Text] For cathode protection of pipelines against corrosion, various current sources are employed including the power network, gasoline electric units, galvanic cells, thermal electric generators and so forth.

The choice of the power source depends upon the conditions of the pipeline's location.

In areas with an average annual wind velocity of 4 m per second and more, it is possible to effectively use wind-powered cathode plants as an autonomous power source.

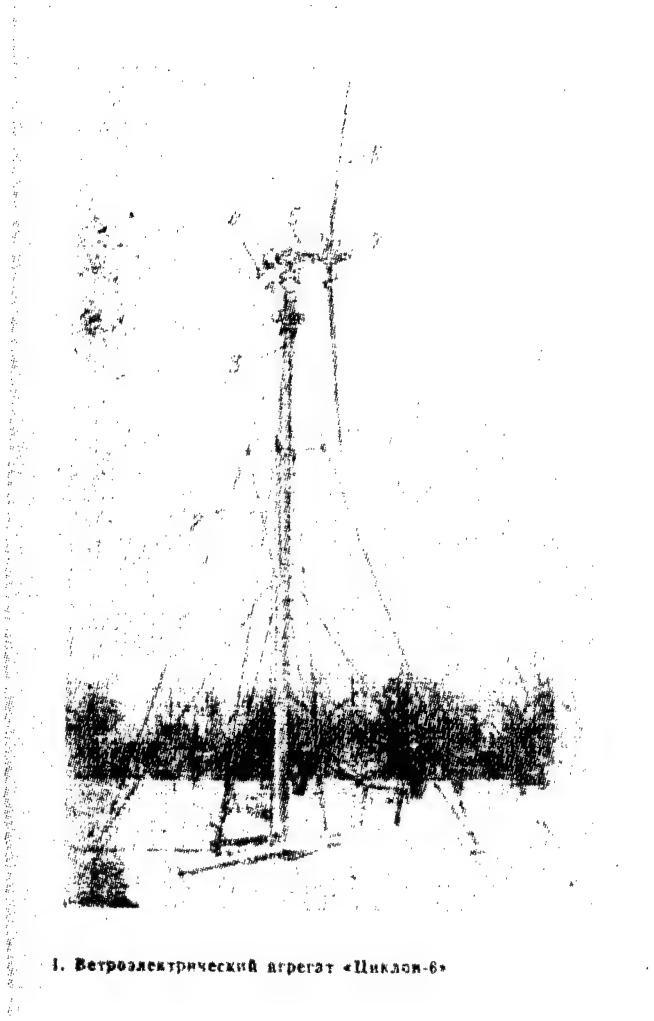
Great experience in the cathode protection of metal pipelines was acquired after the manufacturing of the wind-powered cathode plants at the All-Union Scientific Research Institute for Electromechanics (VNIIEM).

As an example, one can give the two cathode plants of the KSV-1-5 type (a power of 1 kilowatt) at the Kharkov Main Gas Line Administration. These plants were set up on a 213-km section of the Shebelinsk--Ostrogozhsk gas line.

At present, preparations are underway for the series manufacturing of the Tsiklon wind units coupled with generators of 2 and 4 kilowatt capacity. The Tsiklon-6 wind unit is designed for electrifying various consumers, including for cathode protection of main pipelines. The choice of the power of the wind unit depends upon the average annual wind velocity in the designated area.

The power of the wind-driven cathode plants based on the Tsiklon-6 wind unit is 2- and 4-fold higher than the capacity of the KSV-1-5 cathode plants.

Fig. 1 shows the design of the Tsiklon-6 wind-powered unit consisting of the following basic assemblies: a double-blade rotor 6, a mechanical reduction unit and AC generator located in the housing of the spinning part 5, the tail vane 4 which through a special worm reducer automatically puts the rotor in the direction of the actual wind current. The tail vane has a diameter of 0.9 m and consists of six vanes.



1. Ветроэлектрический агрегат «Циклон-6»

Fig. 1. The Tsiklon-6 Wind-Powered Generator

The support mast 3 is a tubular element with the toning portion of the wind unit fastened on it. The support has three levels of guy wires 2 for holding the wind unit to the foundation 1.

The double-bladed rotor turns in the housing on ball bearings. A radial thrust bearing carries the load from the centrifugal forces operating on the blade. For reducing the overhang of the rotor relative to the support mast, the rotor blades are fastened in the housing at an angle of 5° to the plane of its rotation toward the wind. The parts of the control mechanism are covered by a streamlined cap 7.

For stabilizing the rotor turning speed of the windmill with a gusty wind current, it is equipped with a special centrifugal aerodynamic governor. This governor is the primary mechanical voltage regulator, that is, the first stage in stabilizing the voltage of the cathode plant.

The converting of the voltage and its more accurate regulation are provided by a special unit of the plant. The turning speed regulator consists of start and operating springs, centrifugal weights, the kinematic coupling rod and a limiter.

With the forced stopping of the unit, the tightening of the cable is transmitted through a system of levers and links to the rod. The cable compresses the working spring, the blades are put in a nonworking position and the unit stops. In releasing the cable, the working and starting springs are freed and the blades assume the working position.

The reducer is two-stage (a gear ratio i = 8.06) and consists of two pairs of cylindrical gears located in a housing cast from aluminum alloy.

On the main shaft of the reducer is the bushing of the wind wheel. On the housing is a flange for connecting the generator. For the windmill they have developed a special contactless AC generator with a clawed rotor and external magnetic circuit.

Basic Characteristics of Generator:

Line voltage of armature winding with corresponding phase mating, V	400/320
Rated frequency, hertz	50
Turning speed, second^{-1}	25.5
Cooling	air
Total service life of generator	10 years

When the generator reaches the set angular velocity, the automatic control system provides its self-excitation.

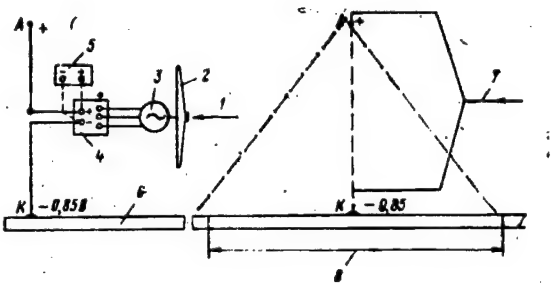


Fig. 2. Diagram of Wind-Powered Cathode Plant and Pipeline Protection Area

Fig. 2 shows a diagram of the cathode plant based on the Tsiklon-6 windmill and a diagram of the pipeline's protected zone.

The wind energy 1 directly effects the rotor 2 of the windmill which turns it initially into mechanical and then electrical energy. The electric energy from the AC generator 3 goes to the converter 4 where it is transformed (stepped down) and rectified, simultaneously charging the storage battery 5 and providing power for pipeline protection 6. The electric supply for the protected pipeline is provided from the power sources 4 or 5 over the electric line 7. The diagram also shows the protective zone 8 of the pipeline.

The device 4 is designed to convert the alternating current (generated by the windmill) into direct, rectified current for maintaining within an accuracy of ±20 percent the amount of output voltage supplied to the protected pipeline and

for automatically disconnecting the storage battery from complete discharging and its subsequent connecting for charging from the windmill.

The device makes it possible to obtain nominal voltages on the output terminals of 3.75-25 volts with stepped regulation every 1.25 volts. The maximum current of the transformer is 20 amps with nominal output voltages of 3.75-12.5 volts and 10 amps with voltages of 13.75-25 volts.

The storage battery which operates as a floating service is the back-up power source in the event of stopping the windmill with a slight wind velocity or a calm. The battery consists of alkali nickel-cadmium storage cells of the KN-100 type.

The adopted range of voltage on the output of the converter corresponds to the nominal voltages of the storage battery with the sequential connecting of from 3 to 20 KN-100 type cells in it (figuring 1.25 volts per cell).

The basic advantages of the nickel-cadmium cells over the lead-acid ones is the absence of sulfitation, the reduction in standing loss by 1.5-2-fold and the increase in the service life by 3-5-fold.

For improving the operating characteristics of the Tsiklon-6 windmill and for ensuring its high operational reliability over several subsequent years, certain assemblies of the wind-powered unit have been improved.

For example, the authors of this article have invented a device for the excitation and de-energization of the wind-powered unit* making it possible to increase the productivity of the Tsiklon-6 windmill.

The device includes the synchronous generator of the wind-powered unit having an excitation winding the power circuit of which through a rectifier bridge is connected to the generator's compound excitation system. A power unit has been connected to the generator's terminals and to the output of the unit they have connected in sequence a master for the settings of the generator de-energization frequency in the form of a stabilizer diode network with a switching element and a stabilizing cell. In parallel to the latter a threshold cell has been connected consisting of a transistor gate and a voltage relay. Through the opening contacts of this relay in parallel to the input of the above-mentioned rectifier bridge, a so-called compensating choke has been connected and this is the master for the range of operating frequencies and voltage of the generator at the moment of its excitation.

In the process of starting up the wind-powered unit, upon reaching a certain frequency, the inductive resistance of the compensating choke becomes so great that its shunting action on the generator's excitation winding through the rectifier bridge is virtually not felt and the generator begins to excite, and here the voltage on its terminals increases. Upon reaching a certain voltage

---

* "Certificate of Invention No 741402," BYULLETEN', No 22 of 16 June 1980.

value on the output of the power unit, the threshold element in the form of the transistor gate and the voltage relay is activated. The designated relay by its break contacts shuts off the compensating choke and this accelerates the concluding of the generator excitation process and excludes the unnecessary operation of the choke with the excited generator.

The required frequency at which the generator excites can be set by changing, for example, the opening in the choke's magnetic circuit, that is, by changing its inductance.

As a result of an experimental test of the excitation system, it was established that the average value of the generator's excitation frequency equals 38 hertz.

The setting of the voltage on the output of the power unit whereby the transistor gate with the voltage relay is activated is set by the number of stabilizer diodes from the stabilizer diode chain connected by the switching element into the power circuit of the stabilizing cell.

With a natural drop in wind velocity and with a decline in the generator's frequency to a certain value whereby the voltage on the output of the power unit is somewhat less than the tripping voltage for the transistor gate and the voltage relay, the latter by its break contacts connects the compensating choke in parallel to the input of the rectifier bridge. Here, as a consequence of the shunting action of the compensating choke to the excitation winding, the generator is not excited.

The automatic disconnecting of the compensating choke in the generator's excitation mode makes it possible with lower wind velocities to significantly increase the turning speed of the wind unit.

The disconnecting of the choke with an excited generator excludes a ballast load caused by the values of active and induced power. Here there is a reduction in the armature's demagnetizing reaction in the excitation system caused by the residual currents of the induced load and the power coefficient and overall efficiency of the excitation system are increased. The speed and excitation forcing ratio are increased, that is, the dynamic characteristics of the generator's excitation system as a whole are improved.

In a mode of the generator's de-energization, the choke automatically switches on and at low speeds, in providing a great resistance in the winding circuit, accelerates the de-energization process, thereby preparing the system.

The process of the de-energization of the generator is carried out at various frequencies. In altering the number of connected stabilizer diodes in the stabilizing cell of the threshold unit, it is possible to change the amount of the reference voltage for the working settings of the voltage relay and thereby regulate the de-energizing of the generation by frequency in a range from 10 to 28 hertz.

One of the main advantages of the new cathode wind-powered plant based on the Tsiklon-6 windmill is the standardizing of the basic design elements of the unit, regardless of the amount of power, as well as the possibility of rationally choosing the power of the cathode plant depending upon the specific wind area.

For example, in areas where the average annual wind velocity is not more than 5 m per second, the power of the cathode plant is considered equal to 2 kilowatts, and in areas with an average annual wind velocity from 5 m per second and more, it is advisable to use a windmill with a power of 4 kilowatts. This windmill can be used not only for cathode protection but also for power supply for other users.

10272
CSO: 1822/290

PIPELINE CONSTRUCTION

GAS FLOWS FROM KARA-KUM'S UCH-ADZHI FIELD

Ashkhabad TURKMENSKAYA ISKRA in Russian 8 Jun 84 p 1

[TURKMENINFORM Article: "The Gas River Source"]

[Text] A powerful tributary appeared in the Central Asia-Tsentr gas "river". Fuel from Uch-Adzhi in the Central Kara-Kum was fed into the main gas pipeline. Output of the field is three billion cubic meters of gas a year.

Builders of the surfade field facilities passed the most difficult test with honor--work in the depths of the Kara-Kum. The experience gained in constructing other fields in the desert was useful. A many-kilometer asphalt road to Uch-Adzhi was constructed earlier, and here a well-built workers' settlement sprang up. Many groups of installations in the complex were transported to the field already assembled, and then arranged in large blocks. The brigade contract was widely distributed among the workers.

Gas production in Turkmenistan intensifies the extraction of fuel. Along with the development of new sources, production of gas from old sources is being improved. In the past year, for the first time in the republic, a five-kilometer deep well yielded fuel. Such wells are now being sunk in the famous Shatlykskiy field. At the end of last year, also for the first time, development of sulfur-containing producing horizons in the Gugurtlinskiy field was begun. Automating the processes in gas production helps to reduce costs and to accelerate development of the desert's buried riches. At present, nearly 20 major fields are operating in the Kara-Kum, annual fuel production in the republic exceeds by 60-fold the amount of gas extracted in the first years of growth of this new branch of the economy of Turkmenistan.

By the end of the Five-Year Plan gas production in the republic is targeted to reach up to 81-83 billion cubic meters a year.

12304
CSO: 1822/322

BRIEFS

CHUVASH PIPELINE SECTION OPENED--The 127-kilometer Chuvash section of the Urengoy-Tsentr-1 gas pipeline was placed into service. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 25, Jun 84 p 3] 12340

NOVOCHEBOKSARY PIPELINE CONSTRUCTION BEGUN--Pipe laying was begun on the gas pipeline that will connect the Urengoy-Pomary-Uzhgorod main line (pipeline transits the Chuvash region) with Novocheboksary. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 22, May 84 p 3] 12304

FAR EAST PIPELINE BEGUN--Sakhalin--Pipelaying was begun on the first main gas pipeline in the Far East. It will connect the city of youth, Komsomolsk-na-Amure, with the sources of cheap natural fuel in North Sakhalin. The 500-kilometer line will run beside the existing oil artery, laid about 40 years ago during the war, whose construction was described in the book "Far from Moscow" by Vasiliy Azhayev. The route will traverse the stormy Tatar Strait and the willful Amur. One and a half billion cubic meters of gas a year will flow to the young, rapidly developing economic center of the Far East. This will permit the city's thermoelectric power stations, the open-hearth furnaces of Amurstal' and boiler plants to convert from coal and oil to cheap gas, and to gasify apartments. Gas from Sakhalin will flow to Komsomolsk-na-Amure in the first half of 1986. [By Yu. Ralin] [Text] [Moscow STROITEL'NAYA GAZETA in Russian 15 Feb 84 p 3] 12304

YAMBURG GAS PIPELINE PROJECT--Donetsk--In Donetsk's YuzhNIIgiprogaz, a plan for developing the Yamburg field-the country's largest blue gas deposit-was worked out. The first working drawings on the subject of the so-called "pioneer production" were sent to customers. The plan envisions drilling hundreds of development wells in clusters, with 3-4 wells in each cluster. These clusters will comprise more than a hundred production sites, connected to all the necessary pipelines. In 1986 Yamburg must yield the first gas to be sent to the center of the country along big-diameter pipe, spanning a distance of more than 3,000 kilometers. The general contractor, YuzhNIIgiprogaz, developed this plan, and Leningrad designers proposed many original solutions concerning building the residential area, port, and treatment facilities. The plan for developing

the Yamburg gas deposit specifies introduction of many technical innovations: for the first time, a high-capacity facility for treating gas in the block-pontoon method will be used, as well as other highly efficient plants and machines. The Yuzhgiprogaz collective designed all the main pipelines built in our country in recent years, including the gas pipeline of the century--"Urengoy-Pomary-Uzhgorod". Its quality is considered very high, as is its technical level. [By N. Lisovenko, IZVESTIYA correspondent] [Text] [Moscow IZVESTIYA In Russian 25 Apr 84 p 1] 12304

CSO: 1822/322

END